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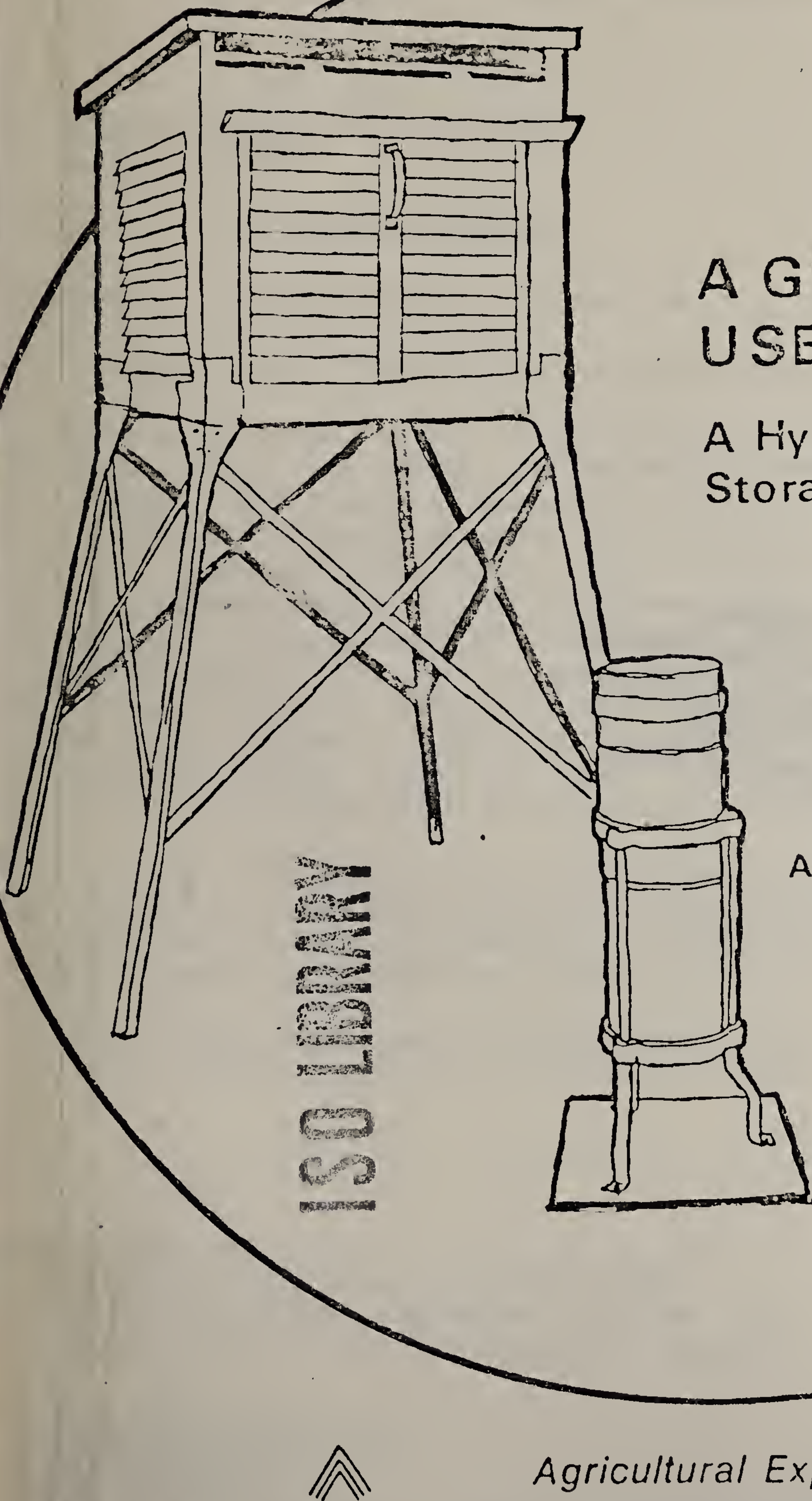

A GUIDE TO THE USE OF HISARS

A Hydrologic Information Storage and Retrieval System

Myron Molnau

DEPARTMENT OF
AGRICULTURAL ENGINEERING

Agricultural Experiment Station

UNIVERSITY OF IDAHO

College of Agriculture

United States Department of the Interior

IN REPLY REFER TO
7200 (931)

BUREAU OF LAND MANAGEMENT
Idaho State Office
Federal Building
550 W. Fort Street
Box 042
Boise, Idaho 83724

August 14, 1980

Information Memo No. ID-80-147
Expires 9/30/81

To: All District Managers

From: Chief, Division of Resources

Subject: Use of "Hydrologic Information Storage and Retrieval System" - HISARS

We have now gained access to the University of Idaho's computer facility in Moscow, Idaho, for use of the "Hydrologic Information Storage and Retrieval System" (HISARS). The system is operated by the State of Idaho climatologist and contains all official climatological records in Idaho. The system allows climate information, such as precipitation, to be printed out on the Districts' computer terminal. The HISAR System, in conjunction with internal statistics programs, can calculate averages, medians, variability, etc., on any number of stations. The turn-around time for the information is less than 24 hours since the system is a "batch" process. This means that a specialist can dial up the computer, ask for specific pieces of information, then sign off. After the request is processed at the University of Idaho's computer center, it is placed in storage until a specialist calls up the computer and asks it to print out the needed data.

The use of HISARS should vastly improve the Districts' ability to obtain climatic data and to summarize it in a useful format. We expect to have a training session on the use of HISARS in the fall, but until then we have included some procedures, instructions and operational manuals.

If you require assistance, please contact the S.O. Hydrologist.

J. David Brunner
Acting

3 Enclosures
- Encl. 1 - Procedure for using HISARS
- Encl. 2 - U of I - Computer Services
- Encl. 3 - U of I - Guide to use of HISARS

Distribution w/o encls.
Director (855) - 2
SCD (D-559-A) - 3
Chief, ISO-940 w/encl. 1 only

PROCEDURE FOR USING "HYDROLOGIC INFORMATION

STORAGE AND RETRIEVAL SYSTEM"

1. All commands to be entered through the terminal should be written down prior to log-on to reduce phone charge and terminal time.

2. Log-on should be recorded on a Telephone-Data Circuit Usage Record, showing date, destination(as Moscow, Id.),log-on and log-off time, elapsed time under DDD (direct distance dialing) and USER.

3. Turn on terminal, set "parity" to 4 which ignores incomming parity. Set "baud" to 300.

4. Dial 1-885-7811 to obtain computer. When tone is heard, press "data" button on telephone.

(in the following instructions --computer response is denoted in CAPS and terminal input is denoted in small letters)

after dial-up...
ON AT (TIME) (DATE) (DAY) LINE#
USER NUMBER, PASSWORD?
saa___,ui (THE UI is the standard first time entry password, this should
(user #) should be changed in thenext step)

READY

password password (new password is 1-8 characters)
(enter new password)

READY

width 51 (WIDTH IS USED TO SPECIFY OUTPUT OTHER THAN 72 characters)

5. Hysars can now be accessed but an access program must be entered. next entry to computer is....

100 //jjobname job (csblm,___-__-____),'user' (see item 12 for default info)
(1-7char.) (social security #)

110 /*dest=thold (this holds output in a batch remote mode)

120 //jobname exec hisars (this gets hisars)
(jobname from above)

130 access (this command signals the beginning of a group of command cards constituting a single access request.)

140 element rainfall (the element command identifies the element(s) for which the access is requested. Element operand includes streamflow, rainfall, temperature, evaporation, snowfall, event, peakflow, and hourrain)

Other basic commands can be used for various information. See the HISARS manual for more detail. Therest of the instruction will be ending commands and data retreival.

Encl 1

6. The following is a continuation of the program to get the data that has been accessed in the proper format. For example, after accessing the element rainfall we can specify a particular area, station, county etc.

150 county owyhee (you could have specified a station number, region,location)

(additional commands can be used to specify a period of record)

7. The next command directs the system to produce certain listings of the accessed data.

160 list index (this would list and index of the rainfall data and stations in Owyhee county)

Other options are available so consult your hisars manual for more info.

8. The final command or card should be a // to identify the end of the command programs.

170 //

9. The next command can be a SAVE command or LIST command or SUBMIT command. The save command temporarily saves the program in a file with a job name...

save jobname
READY
The LIST command would print out your program...
list jobname
READY

The SUBMIT command would submit your program to the batch processor.

submit jobname

SUBMITTED AT (TIME)

10. The nest command could end your session on the terminal if you have subimtted all the jobs you need to.

off
OFF AT (TIME)
PROC TIME 0 SEC.
TERM TIME __MIN. (use this number to enter on your telephone log)

11. The next step is to get the data out of the processor. You should allow at least 4 hours or preferably a day before trying to get your data out of the computer.

To check on the status of a job you can type...

```
job jjobname
NOT FOUND                  (this will be the response if nothing is found
                            in THOLD)
```

If the data is ready to be taken out you will enter...

```
scan jjobname                     (the scan command - the jobs output will enter
                                   the SYSOUT classes, while in the scan mode
                                   all other commands will be ignored except
                                   clear- gets you out of scan mode
                                   find-finds specific strings
                                   list-list all lines of data (the listing of
                                      data can be interupted by hitting the
                                      attention key or break key)
                                   next-moves you on to the next data set
                                   begin-returns you to the start of the job

JCL MSGS SYSOUT =A                (this is input output info that will not include
?                                  your data, computer responds with a ?)

next
SYSPRINT SYSOUT=A                 (this is the data you're interested in)

list                              (computer now prints the entire dataset)
```

Other scan features can be used to review or recall specific data.

```
DATA PRINTS OUT

?

clear                             (this returns you to the system mode for other
                                   commands or to get you off the line)

READY
off
OFF AT (TIME)
PROC TIME _SEC.
TERM TIME _MIN.                   (Be sure to record and report your terminal time
                                   to the phone record sheet and to give your phone
                                   charges to your AO so he knows where they came
                                   from. This should be done at the end of each month)
```

12. Many other types of commands are in the user guides.
The job card can be altered if you will exceed the default limits.
4000 lines is default, 60 seconds is default.

Instructions for the THOLD system are on computer type print-outs in the back of the CALL/VS users guide.

If you have questions about things in the manual or have trouble talking to the U of I computer call:

Charlie Rice
or U OF I
Bill Pyle at 885-6721

Your account user numbers are coming to you under blue envelope.

Do not exceed $100.00 computer + terminal time without calling Gebhardt

Please send a summary of your activity on the U of I computer each month to Gebhardt ISO 931.

Computer Services

// on # 8:30 at earliest

1/2 hour

CALL/VS

USER'S GUIDE

COMPUTER SERVICES

REVISED JULY, 1976

PRICE $1.50

University of Idaho
Moscow, Idaho/83843

Encl 2

UPDATING FEATURE

To obtain updates for this User's Guide, please return the lower portion of this page.

CALL/VS USER'S GUIDE

SEND TO: User Services
Data Controller
Computer Services
University of Idaho
Moscow, ID 83843

NAME ______________________________

Department ______________________________

Mailing Address ______________________________

____

____

The purpose of this manual is to serve as a User's Guide to the CALL/VS system as it is installed at the University of Idaho. It is designed to acquaint the beginning user with the procedures for obtaining access to the system, running programs, and writing programs.

A WORD ABOUT CALL/VS

CALL/VS is a very simple system to use. CALL/VS is a time-sharing system designed to run under the OS/VS1 operating system. It was designed for rapid response for interactive computing.

Once a user is logged on the system, four libraries are accessable:

1. The library associated with the user's userid,
2. The *library (single star library) -- a library shared by a group of userids with common first four characters of the userid,
3. The **library (double star library) -- a library shared by all users. Any user can place entries in the double star library,
4. The ***library (triple star library) -- a library shared by all users. Only the Computer Center can place entries in this library. CAT ***

In reality, only the userid library and the triple star library are true libraries. The single and double star libraries are directories. They have entries which point to the true locations of the programs or data files. This system avoids costly duplication of files. This manual will refer to the single and double star directories as libraries for consistency.

INPUT

```
TEST          15:02    04/25/80   FRIDAY

100 //JTEST   JOB   (CSBLM,528-80-2710),'GEBHARDT'
105 /* DEST=THOLD
120 //TEST     EXEC HISARS
130 ACCESS
140 ELEMENT RAINFALL
145 REGION 06
150 COUNTY OWYHEE,BRUNEAU,TWIN
160 LIST INDEX
170 //

SUBMIT TEST
TEST   NOT FOUND OR OBJECT PROGRAM
SAVE TEST
READY

SUBMIT TEST
SUBMITTED AT 15:03

SCAN JTEST
NOT FOUND

SCAN TEST
NOT FOUND

OFF
OFF AT 15:04
PROC TIME      0 SEC.
TERM TIME    19 MIN.
```

RETRIEVAL

```
ON AT  9:33   04/28/80  MONDAY  LINE 8
USER NUMBER,PASSWORD?
[redacted]
READY

SCAN JTEST
JCL MSGS SYSOUT=A
?
/KJ$EST  JOB  (XXXXX,528-80-2710),'GEBHARDT'
LOG IEF403I JTEST    STARTED TIME=15.38.45 USER=THOLD
LOG IEF234E D 15A,USR004
LOG IEF533A M 15A,USR001,,JTEST,HISARS
LOG UIM023I  JOB 'JTEST    ' SYSOUT=A.   77 RECORDS
LOG IEF404I JTEST    ENDED   TIME=15.41.18
//TEST     EXEC HISARS
XXHISARS    PROC
00000100
************
00000200
***      PROC  FOR THE HISARS DATA STORAGE AND RETRIEVAL SYSTEM
00000300
***             MYRON MOLNAU, AGRCULTURAL ENGINEERING, PHONE 6182
00000400
***             PROC VERSION OF JANUARY,1980
00000500
************
00000600
XXHISARS  EXEC  PGM=MAIN
00000700
XXSTEPLIB  DD  DISP=SHR,DSN=HISARS.JAN80
00000800
XXSYSPRINT  DD  SYSOUT=A
00000900
XXQPOUT  DD  DSN=&&QP,SPACE=(3000,(10,10)),UNIT=DISK,
00001000
XX    DCB=(RECFM=F,BLKSIZE=3000,LRECL=3000,BUFNO=1)
00001100
XXSAVE  DD  DISP=SHR,DSN=HISARS.COUNTS
00001200
XXISNO  DD  DISP=SHR,DSN=INDEX.SNOWFALL
00001300
XXIWAT  DD  DISP=SHR,DSN=INDEX.PANTEMP
00001400
```

```
IEF285I   SYS80116.T153840.RF108.STEST.WF                      DELETED
IEF285I   VOL SER NOS= VS0009.
IEF285I   HISARS.COUNTS                                         KEPT
IEF285I   VOL SER NOS= USR001.
IEF285I   INDEX.SNOWFALL                                        KEPT
IEF285I   VOL SER NOS= USR001.
IEF285I   INDEX.PANTEMP                                         KEPT
IEF285I   VOL SER NOS= USR001.
IEF285I   INDEX.PRECIP.DAILY                                    KEPT
IEF285I   VOL SER NOS= USR001.
IEF285I   INDEX.PRECIP.HOUR                                     KEPT
IEF285I   VOL SER NOS= USR001.
IEF285I   INDEX.EVAP                                            KEPT
IEF285I   VOL SER NOS= USR001.
IEF285I   INDEX.EVENT                                           KEPT
IEF285I   VOL SER NOS= USR001.
IEF285I   INDEX.AIRTEMP                                         KEPT
IEF285I   VOL SER NOS= USR001.
IEF285I   INDEX.STREAM                                          KEPT
IEF285I   VOL SER NOS= USR001.
IEF285I   INDEX.PEAKS                                           KEPT
IEF285I   VOL SER NOS= USR001.
IEF285I   INDEX.RESVOIR                                         KEPT
IEF285I   VOL SER NOS= USR001.
IEF285I   HISDATA.SNOWFALL                                      KEPT
IEF285I   VOL SER NOS= USR001.
IEF285I   HISDATA.PANTEMP                                       KEPT
IEF285I   VOL SER NOS= USR001.
IEF285I   HISDATA.PRECIP.DAILY                                  KEPT
IEF285I   VOL SER NOS= USR001.
IEF285I   HISDATA.PRECIP.HOU
?NEXT
SYSPRINT SYSOUT=A
?LIST

                                                         NORTH CAROLINA STATE
NIVERSITY
                                         *     *      ***       ***       ***
         *****         ***
                                         *     *       *       *   *      *
         *    *        *   *
                                         *     *       *       *          *
*        *    *        *
                                         *******       *        ****      ****
*        *****         ****
                                         *     *       *            *     *
*        *   *              *
                                         *     *       *      *     *     *
*        *    *      *      *
                                         *     *      ***      *****      *
*        *     *       *****
                                               HYDROLOGIC INFORMATION STORAGE
ND RETRIEVAL SYSTEM
          VERSION OF 03/01/75
                                      RUN ON    25 APR  1980

                                          AT    15:41:04
                                     DATA ACCESS REQUESTED FOR:
                                          1  ELEMENT -  RAINFALL
                                          1  REGION  -  06
                                          1  COUNTY  -   OWYHEE,BRUNEAU,TWIN
                                     ACTION REQUESTED:
                                               LIST INDEX
```

UNIVERSITY OF IDAHO VERSION OF FEBRUARY, 1976
A USERS GUIDE IS AVAILABLE FROM THE AG INFORMATION OFFICE
IN THE BASEMENT OF THE AG SCIENCE BUILDING
ASK FOR MISCELLANEOUS SERIES PUBLICATION NO. 32

RAINFALL STATIONS

GRASMERE OWYHEE
STATION NO. 10-3809
LATITUDE 42-23-00 LONGITUDE 115-53-00 GEOGRAPHIC L
OCATION BLOCK 4215-233-111
ELEVATION 5144 FT MSL REGION 06 BASIN 12

PERIOD OF RECORDS	LENGTH, MONTHS
04/1961 - 06/1964	39
08/1964 - 03/1974	116

GRASMERE 8 S OWYHEE
STATION NO. 10-3811
LATITUDE 42-16-00 LONGITUDE 115-53-00 GEOGRAPHIC L
OCATION BLOCK 4215-232-114
ELEVATION 5130 FT MSL REGION 06 BASIN 12

PERIOD OF RECORDS	LENGTH, MONTHS
04/1963 - 06/1963	3
08/1963 - 07/1966	36
09/1966 - 07/1969	35
09/1969 - 06/1972	34
08/1972 - 12/1972	5

HOLLISTER TWIN FALLS
STATION NO. 10-4295
LATITUDE 42-21-00 LONGITUDE 114-34-00 GEOGRAPHIC L
OCATION BLOCK 4214-241-341
ELEVATION 4525 FT MSL REGION 06 BASIN 12

PERIOD OF RECORDS	LENGTH, MONTHS
08/1948 - 12/1977	353

REYNOLDS OWYHEE
STATION NO. 10-7648
LATITUDE 43-12-00 LONGITUDE 116-45-00 GEOGRAPHIC
OCATION BLOCK 4316-224-411
ELEVATION 3930 FT MSL REGION 06 BASIN 12

PERIOD OF RECORDS	LENGTH, MONTHS
01/1962 - 12/1977	192

THREE CREEK OWYHEE
STATION NO. 10-9119
LATITUDE 42-05-00 LONGITUDE 115-15-00 GEOGRAPHIC
OCATION BLOCK 4215-121-414
ELEVATION 5460 FT MSL REGION 06 BASIN 12

PERIOD OF RECORDS	LENGTH, MONTHS
07/1940 - 12/1943	42
02/1944 - 12/1950	83
02/1951 - 07/1952	18
11/1952 - 07/1959	81
04/1961 - 06/1963	27
08/1963 - 12/1977	173

TRIANGLE RANCH OWYHEE
STATION NO. 10-9197
LATITUDE 42-47-00 LONGITUDE 116-37-00 GEOGRAPHIC
OCATION BLOCK 4216-341-232
ELEVATION 5290 FT MSL REGION 06 BASIN 13

PERIOD OF RECORDS	LENGTH, MONTHS
01/1962 - 09/1963	21
11/1963 - 04/1964	6
07/1966 - 08/1966	2

FIND 57,OWYHEE

```
?NEXT
 END OF SYSOUT CLASS
?LIST
WHAT?DS
WHAT?

WHAT?SCAN JTEST
WHAT?SCNA
WHAT?SCAN JTEST
WHAT?NEXT
END OF JOB
?BEGIN
JCL MSGS SYSOUT=A
?NEXT
SYSPRINT SYSOUT=A
?FIND 57,OWYHEE
END-OF-FILE
?BEGIN
JCL MSGS SYSOUT=A
?FIND 57,OWYHEE
END-OF-FILE
?FIND 57,OWHY
END-OF-FILE
?FIND 57,OWYHEE
END-OF-FILE
?BEGIN
JCL MSGS SYSOUT=A
//JTEST  JOB  (XXXXX,528-80-2710),'GEBHARDT'
LOG IEF403I JTEST     STARTED TIME=15.38.45 USER=THOLD
LOG IEF234E D 15A,USR004
LOG IEF533A M 15A,USR001,,JTEST,HISARS
LOG UIM023I  JOB 'JTEST    ' SYSOUT=A.  77 RECORDS
LOG IEF404I JTEST     ENDED   TIME=15.41.18
//TEST    EXEC HISARS
XXHISARS    PROC
00000100
************
00000200
***     PROC  FOR THE HISARS DATA STORAGE AND RETRIEVAL SYSTEM
00000300
***           MYRON MOLNAU, AGRCULTURAL ENGINEERING, PHONE 6182
00000400
***           PROC VERSION OF JANUARY,1980
00000500
****
?NEXT
SYSPRINT SYSOUT=A
TRIANGLE2DATEANGLE

                                                              OWYHEE
                  STATION NO.  10-9197

END-OF-FILE
?FIND 1/80,OWHYEE
END-OF-FILE
?BEGIN
JCL MSGS SYSOUT=A
?NEXT
SYSPRINT SYSOUT=A
?FIND 1/80,OWHYEE

END-OF-FILE
?BEGIN
JCL MSGS SYSOUT=A
?NEXT
SYSPRINT SYSOUT=A
```

```
?FIND1/
SYNTAX ERROR NEAR 'D1/'
?FIND 1/20,TRIANGLE

SYNTAX ERROR NEAR '1/20'
?FIND 1/20,TRING

END-OF-FILE
?
 BEGIN
JCL MSGS SYSOUT=A
?NEXT
SYSPRINT SYSOUT=A
?FIND 1/20,TRIANGLE
TRIANGLE RANCH                                                      OWYHEE
               STATION NO.  10-9197

END-OF-FILE
?BEGIN
JCL MSGS SYSOUT=A
?NEXT
SYSPRINT SYSOUT=A
?FIND 1/70,OWYHEE
                                         1  COUNTY    -  OWYHEE,BRUNEAU,TWIN
GRASMERE                                                            OWYHEE
               STATION NO.  10-3809
GRASMERE 8 S                                                        OWYHEE
               STATION NO.  10-3811
REYNOLDS                                                            OWYHEE
               STATION NO.  10-7648
THREE CREEK                                                         OWYHEE
               STATION NO.  10-9119
TRIANGLE RANCH                                                      OWYHEE
               STATION NO.  10-9197

END-OF-FILE
?BEGIN
JCL MSGS SYSOUT=A
?NEXT
SYSPRINT SYSOUT=A
?FIND 1/20,GRASMERE,LIST
SYNTAX ERROR NEAR 'ERE,'
GRASMERE/20,GRASMERE
                                                                    OWYHEE
               STATION NO.  10-3809
GRASMERE 8 S                                                        OWYHEE
               STATION NO.  10-3811

END-OF-FILE
?CLEAR
READY

OFF
OFF AT 10:07
PROC TIME    0 SEC.
TERM TIME   34 MIN.
f
```

```
ING JOB OUTPUT TO THE T  MINAL:

OUTE A JOB'S OUTPUT TO THE "TERMINAL HOLD QUEUE",
UDE THE FOLLOWING CARD   THE JOB, STARTING IN COLUMN 1:
 /* DEST=THOLD,PASSWORD
 WILL ROUTE THE JOB'S DATA SETS TO THE THOLD SPOOL
A.  PLEASE NOTE:  THIS IS NOT INTENDED AS A PERMANENT
A FOR STORAGE;  JOBS MAY BE PURGED BY THE SYSTEM AFTER
48 HOURS.  IF ANY SYSTE  PROBLEMS ARE ENCOUNTERED, IT MAY
NECESSARY TO RE-FORMAT T  SPOOL DATA SET, AND ALL OUTPUT
 BE LOST;  IE., RETRIEV  THE OUTPUT AS SOON AS POSSIBLE.
S CARD MAY BE INCLUDED I  ANY JOB SUBMITTED THRU A REMOTE
DER (IE., CALL/VS, FAST  TCH, ETC.).  IT WILL BE IGNORED
A JOB SUBMITTED THRU THE CENTRAL SUBMITTAL WINDOW.  THE
SWORD IS OPTIONAL.  IF SPECIFIED, IT MUST BE SUPPLIED WHEN
RIEVING THE JOB'S OUTPUT.  IT MUST BE 1 THRU 8 CHARACTERS
LENGTH, AND CONTAIN ONLY ALPHANUMERIC CHARACTERS.

RIEVING JOB OUTPUT AT THE TERMINAL:

RETRIEVE JOB OUTPUT AT A TERMINAL, USE THE "SCAN" COMMAND:
  SCAN JOBNAME,NUMBER,PASSWORD
RE "JOBNAME"   IS THE JOB TO SCAN.
   "NUMBER"    IS THE INTERNAL JOB NUMBER, AS GIVEN BY THE
               "JOBSTATUS" COMMAND.  IF OMITTED, AND THE
               JOBNAME IS NOT UNIQUE, THE FIRST JOB LOCATED
               WILL BE RETURNED.
   "PASSWORD"  IS THE RETRIEVAL PASSWORD WHICH WAS OPTIONALLY
               GIVEN ON THE GLOBAL ROUTE CARD.

E THE SCAN COMMAND IS SUCCESSFULLY ENTERED, AND THE JOB
FOUND, "SCAN MODE" IS ENTERED.  THE JOB'S OUTPUT WILL BE
SENTED IN SYSOUT DATA SET ORDER WITHIN SYSOUT CLASS.
AXIMUM OF FIVE SYSOUT CLASSES WILL BE RETURNED.
LE IN SCAN MODE, ALL CALL/VS COMMANDS WILL BE IGNORED;  ONLY
N SUB-COMMANDS MAY BE ENTERED.  THEY ARE:

AR        TO GET OUT OF SCAN MODE.  ONLY THE SCAN WORK AREA WILL
          BE CLEARED;  THE CALL/VS WORK SPACE REMAINS INTACT.
          ALL UNPURGED DATA SETS REMAIN IN THE THOLD QUEUE.

D         TO FIND A SPECIFIC CHARACTER STRING WITHIN THE CURRENT
          DATA SET.  ALL LI ES WITH THE STRING WILL BE LISTED.
          THERE ARE TWO POSITIONAL OPERANDS:  THE RANGE OF
          COLUMNS TO SEARCH, AND THE STRING TO SEARCH FOR.  A
          RANGE OF COLUMNS IS INDICATED BY TWO NUMBERS SEPARATED
          BY A "/".  A SINGL  COLUMN IS INDICATED BY JUST A
          NUMBER.  NOTE:  IF THE STRING POSITION WITHIN THE
          RECORDS IS APPRO  ATELY KNOWN,  KEEP THE SEARCH
          COLUMN RANGE TO A MINIMUM, FOR EFFICIENCY.  THE STRING
          MAY CONTAIN ANY CHARACTERS (INCLUDING THE BLANK),
          EXCEPT THE COMMA, AND MUST BE 1 THRU 8 CHARACTERS IN
          LENGTH.  EXAMPLE:
               FIND  20,HI  ERE
          THIS WILL LIST AL  LINES WITH THE CHARACTER STRING
          "HI THERE" STARTI   IN COLUMN 20 OF THE DATA SET.

ST        TO LIST ALL LINES OF THE DATA SET.

          THE FIND AND LIST COMMANDS MAY ALSO CONTAIN THE
```

```
       FOLLOWING KEYWORD OPERANDS, WHICH MAY BE GIVEN IN
       ANY ORDER:

    NNN          TO START FINDING/LISTING AT LINE "NNN" FROM
                 THE START OF THE DATA SET.

    -NNN         TO START FINDING/LISTING "NNN" LINES BACK FROM
                 THE CURRENT LINE.

    +NNN         TO START FINDING/LISTING "NNN" LINES FORWARD
                 FROM THE CURRENT LINE.

    COMPRESS     TO REMOVE ALL BLANKS FROM LINES.
    NOCOMPRESS   TO NOT REMOVE BLANKS FROM LINES.

    TRUNC=NNN    TO TRUNCATE THE LINE AFTER COLUMN "NNN".
    NOTRUNC      TO NOT TRUNCATE LINES.

       EXAMPLE:  FIND  10/30,SYSOUT,TRU=72,+16,NOC
       THIS WILL LIST ALL LINES WITH THE STRING "SYSOUT"
       STARTING IN COLUMNS TEN THRU THIRTY, TRUNCATING THEM
       AFTER COLUMN 72.  THE STRING SEARCH STARTS WITH THE
       SIXTEENTH LINE FROM THE ONE CURRENTLY POSITIONED AT.
       BLANKS ARE NOT REMOVED FROM LINES.

       COLUMN RANGE, STRING, TRUNCATION, AND/OR
       COMPRESSION WILL REMAIN IN EFFECT FOR THE DURATION OF
       SCAN MODE, OR UNTIL MODIFIED.

    ATTENTION KEY:
       THE LISTING OF OUTPUT MAY BE INTERRUPTED AT ANY TIME
       BY HITTING THE "ATTENTION" OR "BREAK" KEY.  THE
       CURRENT LINE WILL BE TERMINATED;  ANOTHER SCAN
       SUB-COMMAND MUST BE ENTERED.

EXT    TO MOVE ON TO THE NEXT DATASET OR SYSOUT CLASS.  THE
       OPERAND MAY BE "DS" FOR THE NEXT DATA SET, OR "SC"
       FOR THE NEXT SYSOUT CLASS.

IRGE   TO PURGE THE CURRENT DATA SET (DS), SYSOUT CLASS (SC),
       OR THE ENTIRE JOB (JOB).  ONCE SOMETHING IS PURGED,
       IT CANNOT BE RETRIEVED AGAIN.  IF POSITIONED WITHIN A
       DATA SET OR SYSOUT CLASS, BE SURE TO ENTER "PURGE JOB"
       IF YOU INTEND TO PURGE THE ENTIRE JOB.

RINT   TO PRINT THE CURRENT SYSOUT CLASS (SC), OR THE ENTIRE
       JOB (JOB), AT THE REGULAR CENTRAL PRINTER.

       NOTE THAT IT IS NOT POSSIBLE TO PRINT A SINGLE DATA
       SET WITH THE PRINT COMMAND.  IF IT IS THE ONLY ONE
       WANTED WITHIN THE SYSOUT CLASS, ALL OTHER DATA SETS IN
       THE CLASS MUST BE PURGED, THEN THE SYSOUT CLASS CAN BE
       PRINTED;  THE REMAINING DATA SET(S) WILL THEN PRINT.

EGIN   TO RESTART OUTPUT SCANNING AT THE BEGINNING OF THE
       CURRENT SYSOUT CLASS (SC), OR THE BEGINNING OF THE
       JOB (JOB).  THIS SAVES YOU FROM HAVING TO "CLEAR"
       AND RETYPING THE "SCAN" COMMAND.

       OPERANDS FOR NEXT, PURGE, PRINT, AND BEGIN SUB-
       COMMANDS ARE OPTIONAL.  IF OMITTED, OPERATION DEPENDS
       ON THE CURRENT SCAN STATUS.  IF CURRENTLY POSITIONED
       AT A DATA SET, OPERATION IS ON THAT DATA SET ONLY.  IF
```

POSITIONED AT THE END OF A SYSOUT CLASS, OPERATION IS ONLY ON THAT SYSOUT CLASS. IF POSITIONED AT THE END OF THE JOB, OPERATION IS ON THE ENTIRE JOB.

MESSAGES ISSUED BY THE SCAN FUNCTION:

COMMAND DISABLED
THE COMMAND IS DISABLED FOR THE DURATION DUE TO A SYSTEM PROBLEM. SEE USER SERVICES FOR INFORMATION AS TO WHEN THE COMMAND WILL BE AVAILABLE AGAIN.

SYNTAX ERROR NEAR "QQQQ"
SUB-COMMAND OPERAND IS INCORRECT.

WHAT
SUB-COMMAND IS INVALID OR NOT PERMITTED.

NOT FOUND
THE JOB WAS NOT FOUND IN THE "THOLD" QUEUE. EITHER IT HAS NOT YET EXECUTED, "DEST=THOLD" WAS NOT SPECIFIED IN THE JOB'S JCL, OR THE JOB WAS PURGED FROM THE "THOLD" QUEUE BECAUSE IT HAD BEEN THERE FOR AT LEAST 24 HOURS.

INVALID PASSWORD
THE SUPPLIED RETRIEVAL PASSWORD DID NOT MATCH THE ONE GIVEN ON THE "/* DEST=" CARD.

NO WORK SPACE AVAILABLE
THERE ARE CURRENTLY TOO MANY USERS IN "SCAN MODE"; TRY AGAIN LATER.

"DDNAME" SYSOUT="CLASS"
THIS INDICATES THE CURRENT DATA SET AND SYSOUT CLASS POSITIONED AT.

?
THIS IS A PROMPT ISSUED WHILE IN SCAN MODE. ENTER A SCAN SUB-COMMAND.

END-OF-FILE
THE END OF THE CURRENT DATA SET HAS BEEN REACHED.

END OF SYSOUT CLASS
THE END OF THE CURRENT SYSOUT CLASS HAS BEEN REACHED, AND THERE ARE ONE OR MORE REMAINING DATA SETS WITHIN THE SYSOUT CLASS. IF ALL DATA SETS IN THE CLASS HAVE BEEN PURGED, THIS MESSAGE IS NOT ISSUED.

END OF JOB
ALL OF THE JOB'S OUTPUT CLASSES HAVE BEEN SCANNED, AND THERE ARE ONE OR MORE REMAINING SYSOUT CLASSES. IF ALL SYSOUT CLASSES HAVE BEEN PURGED/PRINTED, THIS MESSAGE IS NOT ISSUED.

SYSTEM ERROR "CODE"
AN ERROR HAS OCCURRED; SCAN MODE IS NOT TERMINATED. STATUS OF THE DATA SETS WITHIN THE JOB ARE UNKNOWN. REPORT THE PROBLEM TO USER SERVICES; PLEASE BRING THE TERMINAL OUTPUT LISTING.

KNOWN PROBLEMS:

IONE

ANGES MADE:

ATTENTION KEY DURING LIST/FIND COMMAND

THE BREAK KEY MAY BE HIT AT ANY TIME DURING A LIST OR FIND FUNCTION WHILE THE CPU IS SEARCHING FOR THE NEXT LINE TO LIST. THE SEARCH WILL BE TERMINATED AS SOON AS THE BREAK KEY IS RECOGNIZED; A QUESTION MARK WILL BE ISSUED. THE FILE WILL BE POSITIONED AT WHATEVER LINE IT WAS AT WHEN THE BREAK WAS RECOGNIZED. THIS WAS IMPLEMENTED SO THAT A "FIND" OF A STRING ON A LARGE FILE COULD BE INTERRUPTED IF AN INCORRECT STRING ARGUMENT WAS ENTERED. BEFORE, ONLY AN END-OF-FILE CONDITION OR THE FINDING OF THE REQUESTED LINE WOULD TERMINATE THE LIST OR FIND FUNCTION.

LY 19, PM "NOT FOUND" MESSAGE EXPLANATION CHANGED

UTING JOB OUTPUT TO THE TERMINAL:

ROUTE A JOB'S OUTPUT TO THE "TERMINAL HOLD QUEUE", ... STARTING IN COLUMN 1:

24, AM SUBMIT COMMAND INITIAL DOCUMENTATION

UBMIT A JOB THRU A CALL/VS TERMINAL:

UBMIT A BATCH JOB STREAM TO THE OPERATING SYSTEM, USE THE MIT" COMMAND:

SUBMIT FILE1,FILE2,FILE3,...,FILE12

ENN" IS THE NAME OF A PROGRAM OR DATA FILE IN THE USER'S LOG. IF THE FILE IS A PROGRAM FILE, IT MAY BE ANY LANGUAGE (BASIC, FORTRAN, OR PL/I). IF THE FILE IS A DATA FILE, IT BE "EXTERNAL FORMAT". IE., WRITTEN BY A FORTRAN PROGRAM G FORMAT STATEMENTS, OR A PL/I PROGRAM USING PUT EDIT EMENTS. A PL/I DATA FILE MUST BE WRITTEN AS 80-BYTE LOGICAL RDS (IE., WITH TRAILING BLANKS, IF NEEDED). PROGRAM OR RAN DATA FILES MAY CONTAIN RECORDS OF ANY LENGTH. HOWEVER, WARE THAT IF A CALL/VS PROGRAM IS TO READ THE FILE, IT MUST THE FORMAT OF EACH RECORD IN THE FILE. IF NOT, A "FORMAT ERROR" WILL RESULT.

RECORD WITHIN THE FILE WILL BE SUBMITTED AS A CARD IMAGE S. UP TO 12 FILE NAMES MAY BE SPECIFIED. IF MORE THAN ONE NAME IS GIVEN, THEY WILL BE TREATED AS A SINGLE FILE WHILE G SUBMITTED (THEY ARE CONCATENATED TOGETHER). THE CARDS G SUBMITTED SHOULD REPRESENT A JOB(S), AS IF THEY WERE HED ON CARDS.

OGRAM FILE NAME MAY BE PRECEEDED BY A "=" CHARACTER. THIS LEAVE THE CALL/VS LINE SEQUENCE NUMBERS ON EACH LINE. IF "=" DOES NOT PRECEED THE FILE NAME, THE LINE SEQUENCE ER (5 DIGITS MAXIMUM) AND ONE BLANK, IF PRESENT, WILL BE VED BEFORE CREATING THE 80-BYTE CARD IMAGE TO BE SUBMITTED. TA FILE WILL BE PROCESSED "AS IS"; THERE ARE NO LINE ENCE NUMBERS.

AGES ISSUED BY SUBMIT FUNCTION:

(UNLESS OTHERWISE INDICATED, IF ONE OF THE FOLLOWING ERRORS IS ENCOUNTERED, NO CARDS WILL BE SUBMITTED TO THE SYSTEM.)

MMAND DISABLED
THE COMMAND HAS BEEN DISABLED FOR THE DURATION DUE TO SOME SYSTEM PROBLEM. SEE USER SERVICES FOR INFORMATION AS TO WHEN THE COMMAND WILL AGAIN BE AVAILABLE.

ITAX ERROR
AN EXPECTED FILE NAME IS MISSING OR THERE IS AN EMBEDDED BLANK IN THE OPERAND.

LE NAME EXCEEDS 8 CHARACTERS
AN ENTERED "FILE NAME" IS TOO LONG. A VALID FILE NAME MUST BE 8 CHARACTERS OR LESS IN LENGTH.

RE THAN 12 FILE NAMES
TOO MANY FILE NAMES WERE ENTERED. THERE IS A LIMIT OF 12 FILE NAMES THAT MAY BE ENTERED.

LENAME NOT FOUND OR OBJECT PROGRAM
THE INDICATED FILE NAME WAS NOT FOUND IN THE USER'S CATALOG, OR IT WAS FOUND AND WAS AN OBJECT PROGRAM. OBJECT PROGRAMS CANNOT BE SUBMITTED.

FILENAME NOT EXTERNAL FORMAT
THE INDICATED FILE NAME WAS A DATA FILE, BUT WAS NOT WRITTEN BY A FORTRAN PROGRAM WITH FORMAT STATEMENTS, OR A PL/1 PROGRAM WITH PUT EDIT STATEMENTS. THE FILE CANNOT BE SUBMITTED.

SYSTEM ERROR
A SYSTEM DISK I/O ERROR HAS OCCURRED. PLEASE CONTACT USER SERVICES; BRING THE TERMINAL PRINTOUT.

NO INTERNAL READER AVAILABLE
WHEN CALL/VS ATTEMPTED TO START THE SUBMIT OF THE JOB, NO INTERNAL READER WAS AVAILABLE TO PROCESS THE JOB. THIS COULD BE BECAUSE ALL READERS WERE BUSY PROCESSING OTHER JOBS. RETRY THE COMMAND AFTER WAITING A FEW MOMENTS. IF THIS MESSAGE APPEARS SEVERAL TIMES, THE INTERNAL READERS MAY HAVE BEEN STOPPED FOR SOME OPERATIONAL REASON. SEE USER SERVICES OR THE LOGON MESSAGE FOR INFORMATION AS TO WHEN SUBMISSION WILL AGAIN BE ALLOWED.

1ST CARD IS NOT A JOB CARD
THE 1ST CARD OF THE 1ST FILENAME ENTERED MUST BE RECOGNIZABLE AS AN OS JOB CARD. IF IT IS NOT, THE CARDS BEING SUBMITTED CANNOT BE PROCESSED AS A "JOB".

INTERNAL READER ERROR, CODE XX
ERROR XX HAS OCCURRED WHILE A READER WAS PROCESSING THE CARDS BEING SUBMITTED. PLEASE CONTACT USER SERVICES; BRING THE TERMINAL LISTING. THE LAST JOB BEING SUBMITTED MAY NOT BE COMPLETELY SUBMITTED. USE THE "JOBSTATUS" COMMAND TO DETERMINE THE STATUS OF ALL JOBS BEING SUBMITTED; THEN NOTIFY OPERATOR TO REQUEST CANCELLING OF THE LAST JOB PROCESSED.

SUBMITTED AT HH:MM
THE SUBMIT COMMAND WAS SUCCESSFULLY PROCESSED; ALL CARDS WERE SUBMITTED.

The user also has access to three languages (compilers) and the "data" mode. The languages are BASIC, FORTRAN, and PL/I. the FORTRAN and PL/I languages are subsets of the batch languages. Please refer to later sections of this manual for language restrictions. The default language is BASIC. The maximum program size is 28,848 characters or about 600 statements.

All input/output to CALL/VS is through the terminal or the DIBCADBU utility. It is possible to have programs in card deck form placed in user libraries. Manipulations of this sort are carried by the DIBCADBU utility. Refer to the section on DIBCADBU for more information.

OBTAINING AUTHORIZATION TO USE THE SYSTEM

To use CALL/VS a user must establish an account. An account consists of a user identification code (userid) and an associated password. To commence a terminal session (LOGON), the user must provide the userid and password.

If you are an instructor, researcher, or project director, begin by seeing the Allocations Analyst in the Computer Services main office, ADM 127 to set up a project code. You must have a valid Computer Services project code. Next, fill out the CALL/VS USER ID application form. A copy appears on the next page. You will be assigned two user IDs; one for your students in the class and one for yourself. Both the user IDs will have the same default password of "UI". The instructor should establish a private password. This password should not be given to the class. The instructor's user ID should be used for "pooling" class programs into the

libraries for student use.

Any password which is not locked can be changed by using the PASSWORD command. The command to change the password is:

PASSWORD password

where "password" is the new password of 1-8 characters. The password may contain letters, numbers, or special characters.

Experience with CALL/VS indicates that it is not necessary or prudent for every student in a class to have a unique user ID. It is suggested that only a small number of class user IDs be obtained. It is possible to have the Allocations Analyst lock the password so it cannot be changed. Discuss your needs with the Allocations Analyst to ascertain what is the best modus operandi for the particular situation.

Class files will automatically be purged two weeks before the end of a semester unless prior arrangements are made to keep them with the Allocations Analyst.

LOGGING ON CALL/VS

Call/VS supports two types of terminals: IBM 2741's and Teletype type devices. The 2741 is the selectric typewriter type of device. Most of the Teletype (TTY) devices are EXECUPORT portable terminals. Once a user is logged on, except for the character and line delete functions, the use of CALL/VS is the same for the various types of terminals.

Revised 2/9/77

UNIVERSITY OF IDAHO COMPUTER SERVICES

CALL/VS USER ID
Application Form

Persons desiring to use the CALL/VS facilities of Computer Services should file this application with Computer Services approximately one week before they intend to begin using CALL. Upon receipt of this application Computer Services will assign the CALL USER ID and confirm approval by returning a copy to the person whose name appears on the form.

Each person using CALL must have a UCS assigned project code. This project code may be obtained by filing form UCS 005 with Computer Services.

Computer Services will assign a unique USER ID for each application received. The initial password assigned by Computer Services will be the same for all applications. The first thing a user should do when a USER ID has been assigned is change the password to something that is known only to that user. The password can be anything up to eight characters in length and may contain special characters and imbedded blanks. The user must remember what password is assigned because once it is changed Computer Services will have no record of it and no way of finding out what it is.

1. University Computer Services project code ENGR131
   If you are concurrently submitting form UCS 005, leave item 1 blank.

2. Classification:
   (X) Classroom/Education — Number of Students 25
   ( ) Other

3. Principal User/Instructor PROF J. DOE

4. Department/Campus Address ENGINEERING Phone 7711

To be completed by Computer Services

USER ID ENG1011 PASSWORD UI

APPROVED [signature] DATE 4/30/75

ACCOUNT ESTABLISHED 4/30/75 [initial]
Date Initial

CONFIRMATION MAILED 4/30/75 [initial]
Date Initial

Form No: UCS 055-1
Form Title: CALL/VS USER ID Application Form

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LOGGING ON A 2741

There are two types of 2741's: direct wired and dial-up. If the 2741 does not have a telephone with it, it is a direct wired device. Do the following:

1. Turn the rocker switch on the right side of the console to ON. If it is already on, turn it to OFF then ON.

2. Depress the carriage return key. The terminal will start typing.

If you have a dial-up 2741, do the following:

1. Turn the terminal on.

2. Pick up the phone and dial 7711.

3. When you hear a high pitched sound, pull up the white button in the cradle (or press down the silver button, whichever your phone has).

4. Place the phone down. Do not put the handset back on the cradle.

5. Depress the carriage return and the terminal will begin typing.

6. Skip over the LOGGING ON with a TTY and proceed.

LOGGING ON WITH A TELETYPE

1. Turn on the machine.

2. If you are on a 110 baud (normal) TTY, dial 6668. If you are on a 300 baud TTY, dial 7811.

3. When you hear the high pitched tone, pull up the white button on the phone cradle.

4. Depress the carriage return (on some devices hold down the control key and hit the S key). The machine will begin typing.

When the machine begins to operate, it will type:

```
ON AR 9:55  02/09/77 WEDNESDAY LINE 20
USER NUMBER,PASSWORD?
████████████████
```

The ███████ is a mask. The carriage will return to the beginning of the mask. Type your userid and password separated by a comma over the mask then hit the return key.

The terminal will respond "ready".

You are now logged on the system and ready to proceed.

RUNNING A LIBRARY PROGRAM

If is very easy to run a program that is in one of the libraries. To run a program called PROG1 in the library, simply type:

run prog1

and the program will be loaded into the work area, compiled if necessary, and executed. Remember that the carriage return key must be hit after typing the line.

If the program is in the single star library under the name *PROG1, to run type:

run *prog1

If the program is in the double star library, type:

run **prog1

If in the triple star library, type:

run ***prog1

If the program contains any read statements, the user will be promoted by the terminal with a "V" or a "?". After the V type in

UPDATE OCTOBER 1, 1975

USE WITH 300 BAUD (30 char/sec) LINES

After logging on a terminal which operates at 30 char./sec. (phone number 7811) give the following command:

width 5i

This command is necessary to allow the carriage return to coincide in speed with the data transfer rate of CALL/VS. This command is only necessary when initially logging on the system. It is not necessary when using 2741 terminals or 10 char/second terminals.

the data as per program specification. NOTE: If the read is an edited read, i.e., with a format, it is necessary to type in as many values as it is seeking. For example, if a FORTRAN program had the following statements:

```
   READ (5,1) X
 1 FORMAT (F5.0)
```

The terminal will prompt with a V. The program is expecting five digits to be typed. If the number is not five digits long, it must be padded with zeros or blanks before the return key is hit.

To halt the execution of a program at any time, hit the attention key (BREAK on a TTY) on the terminal. This will halt execution and type:

```
STOP
TIME 2 SECS.
```

WRITING A PROGRAM

The CALL/VS user has a work area for the program currently in use. The work area should be reset or cleared every time a new program is to be written. If a program has been in the work area and not cleared, the new one will be written on top of or interspersed with the old. This is often disasterous. The command to reset the area is:

```
clear
```

Most CALL/VS commands can be abbreviated to three characters. Thus, the following could have been used:

```
cle
```

Often times typing mistakes are made when entering a statement. For example; if while clearing the area cla was typed instead of cle and the return key was not hit, this could be corrected by (on a 2741):

1. backspace to the point where the error was made,

2. hit the attention key.

The computer will react by striking over the bad character and advancing the carriage one line. Then continue typing from that point. For example:

```
clE
  ear
```

On a TTY:

1. hold down the shift key,

2. strike the letter O once for each incorrect character in the line, and once for each correct letter following it (including any blank spaces).

The backspace symbol (←) or the underline symbol is printed for each upper case O. The user then types in the correct information. For example; if the word FORTRAN is misspelled as FURTRAN, it could be changed by typing:

```
FURTRAN←←←←←←ORTRAN
```

This procedure can only be used if the return key has not been hit.

If an error was discovered at the beginning of a long line (before the return), to delete the entire line and start over on a 2741:

1. hold down the shift key,
2. strike the letter J,
3. hit the attention key.

This will cause the computer to type DELETED and forward space the carriage one line. Then retype the line.

On a TTY:

1. hold down the CTRL (control key),
2. strike the letter X.

The system prints out the word DELETED, ends the line automatically and forward spaces the carriage.

Knowing how to correct typing mistakes, a program can now be written. Since most of our users know FORTRAN, the example will be in FORTRAN. The same methods are used for PL/I and BASIC.

Remember that the default language is BASIC; therefore, to write in FORTRAN, we have to type:

enter fortran

FORTRAN could have been abbreviated fort. For PL/I type:

enter pl/i   no abbreviation

For BASIC type:

enter basic   (short form arithmetic)
or
enter basicl   (long form arithmetic)

If data were being inputed type:

enter data

After a mode is entered, the system will stay in that mode until a new mode is entered or a program with a different language mode is loaded. Entering a different language does not clear the work area. If a FORTRAN program was in the work area and the mode was switched to BASIC, the FORTRAN program would remain in the work area and the BASIC program written on top of it with unpredictable results. Remember to clear the work area before starting something new.

Before beginning the program the library should be checked to see what is in it and what program names have been used. To see what is in the library type:

```
cat      (abbreviation for catalog)
```

The response is:

```
9:15  04/22/74  TUESDAY
CWR1  CWR50
```

CWR1 and CWR50 are names of programs or data files in the userid library.

Every program or data statement in CALL/VS is entered with a line number. This line number is used to reference and order the statements. It has no meaning in the program itself (except for BASIC).

Begin writing the program by entering a line number, then one blank space and the statement. For example:

```
10  x=0
```

Continue the program

```
10  x=0.
20  do 5 i=1,10
30  x=x+5.
40  write (6,*)x
50  5 continue
60  end
```

Note the statements are free form. It is not necessary to tab or space to column seven. The line numbers do not have to be in even increments. The only requirements are that the line numbers be unique, positive, and in ascending order to provide the proper sequence of construction. They do not have to be entered in order as the system will sort them into ascending order before they are compiled. This allows the user to enter "forgotten" statements in the program by assigning them a line number that would put them in the proper order. Gaps should be left in the sequence numbers for entering additional statements if necessary.

To compile and execute the program type:

```
run
```

The result is:

```
    9:17  04/22/75  TUESDAY

5.
10.
15.
20.
25.
30.
35.
40.
45.
50.
STOP
TIME 0 SECS.
```

SAVING AND STORING PROGRAMS

Once a workable program is in the work area, it may be saved for future use. To save the program type:

```
SAVE progname
```

where progname is the name given the program. To save it giving it the name "trial" type:

```
save trial
```

To see the result type:

```
cat

9:17  04/22/75  TUESDAY
CWR1  CWR50  TRIAL
```

The program is now saved in <u>source</u> form. The command SAVE will place the program in the work area into the library in source form. If it is desired to place it in the library in object form, the command STORE would be used e.g.

```
store trial
```

This command would place TRIAL in the library in object form. It is important to note that it is not possible to STORE and SAVE the same program using the same name. That is to say, TRIAL could not exist in the library in both source and object form with the name TRIAL. If it is desired to have both source and object stored, then one of them must be given a different name. For example; if TRIAL was in the work area and was saved with the command:

```
save trial
```

It could be stored by issuing the command:

```
store trialo
```

giving it the name trialo (or any other name).

A program can be removed from the library by purging it. The command is:

purge trial

This command will remove TRIAL from all the libraries.

EDITING PROGRAMS

It is easy to edit programs. To edit the program TRIAL if it is not in the work area type:

load trial

This command will cause TRIAL to be loaded into the work area. Only source programs and data files created from the terminal in data mode can be loaded.

LIST

Once the program has been loaded, a listing of the program can be obtained by typing:

```
list

TRIAL          10:43  04/22/75  TUESDAY

10 X = 0.
20 DO 5 I = 1,10
30 X = X + 5.
40 WRITE(6,*) X
50 5 CONTINUE
60 END
```

The listing of a program can be interrupted at any point by depressing the attention (or break) key. A listing can be started at any point in file by adding a line number to the LIST command. For example:

```
list 30
```

would cause the typing to start with line 30.

To list the program without the header line, type:

```
list-n
```

which stands for list no header. To obtain a list without a header or line numbers type:

```
list-nt or list-tn
```

DELETING LINES

A line can be deleted by typing in the line number of the statement to be deleted and hitting return. For example:

```
10
list
TRIAL        10:44  04/22/75  TUESDAY

20 DO 5 I = 1,10
30 X = X + 5.
40 WRITE(6,*) X
50 5 CONTINUE
60 END
```

If is possible to delete more than one statement at a time by using the command DELETE (del). The command takes the form:

```
DELete line number,line number,...
```

For example:

```
del 20,30
```

would cause the statements having line numbers 20 and 30 to be deleted. A group of line numbers can also be deleted. The general form of the command is:

DELete line number THRU line number,...

For example:

del 20 thru 50

would cause the statements having line numbers 20 through 50 to be deleted. THRU can be abbreviated as T.

del 5, 20 T 50, 80

would cause statements having line numbers 5, 20 through 50, and 80 to be deleted.

ADDING STATEMENTS

To add new statements type the new line number and then the statement. For example, in the program TRIAL 10 x=0 had been deleted. To put back the statement giving it statement number 5 (it could have been 10), type:

```
5 X = 0.

list-n

5 X = 0.
20 DO 5 I = 1,10
30 X = X + 5.
40 WRITE(6,*) X
50 5 CONTINUE
60 END
```

Statements can be added to the program by typing in the new statements, giving them statement numbers to fit in the proper place in the program. For example:

```
8 q = 0.
35 q = q + x **2
55 write (6,*) q

list

TRIAL          11:22  04/22/75  TUESDAY

5 X = 0.
8 Q = 0.
20 DO 5 I = 1,10
30 X = X + 5.
35 Q = Q + X **2
40 WRITE(6,*) X
50 5 CONTINUE
55 WRITE (6,*) Q
60 END
```

To run the newly edited program type:

```
run

TRIAL      11:23  04/22/75  TUESDAY

5.
10.
15.
20.
25.
30.
35.
40.
45.
50.
9625.
STOP
TIME 0 SECS.
```

Remember the saved program has not been altered in the library. To save the changes, give the SAVE command. Since the program already has a name, type:

```
save
```

If SAVE command is given and the program does not have a name, the system prints:

FILE NAME--

Then enter the program name.

While inputting a long program, it is a good practice to issue a SAVE command periodically to avoid losing work if the system goes down.

<u>ADD</u>

To add data to the end of a statement use the ADD command. If statement 10 looked like:

```
10 x=0
```

and it was desired to add a decimal point at the end of the line type:

```
add 10,'.'
```

Statement 10 would then look like:

```
10 x=0.
```

The general form of the ADD command is:

```
ADD line number,line number...,'string'
        or
ADD line number T line number...,'string'
        or
ADD ALL,'string'
```

where 'string' is the set of characters to be added to end of the line(s).

STATEMENT CHANGES

Changes can be made in a statement in either of two ways: 1) retype the line number followed by the statement, or 2) use the REPLACE command. Remembering the original program TRIAL:

```
 5 X=0.
20 DO 5 I=1,10
30 X=X + 5.
40 WRITE(6,*) X
50 5 CONTINUE
60 END
```

To change the DO LOOP to 15 iterations instead of 10, the statement could be changed by typing:

```
20 DO 5 I=1, 15
```

Since this statement has the same line number as an existing statement, it replaces the original statement. Remember that a SAVE must be issued before the version saved in the library is changed.

If a statement is long or changes in more than one statement at a time are to be made, use the REPLACE command.

The general form of the REPLACE command is:

REPlace line number,line number...,'string1','string2'

or

REPlace line number THRU line number,'string1','string2'

or

REPlace ALL,'string1','string2'

The command causes each occurrence of the first character string to be replaced by the second character string in the range of line numbers. If the second string is not specified, the first string is deleted each time it is found.

To change the DO LOOP index type:

```
rep 20,'10','15'
```

The system would respond

```
REPLACED 1
```

because only 1 occurrence of '10' was detected in line 20.

FIND

Often times it is desired to locate or find the occurrences of a particular data element. This can be done by using the FIND command. The general form is:[1]

```
FINd line number,line number...,'string' [,NOTEXT]
        or
FINd line number THRU line number,...,'string' [,NOTEXT]
        or
FINd ALL,'string' [,NOTEXT]
```

The NOTEXT option means that only the line numbers will be printed. No text will be given.

To see if any WRITE statements, for example, appeared between line numbers 100 and 200, type:

```
fin 100 T 200,'write'
```

The system would respond:

```
110 WRITE(6,*) x
180 WRITE(6,100) Z,Q,P
```

To find all instances of WRITE statements but suppress the printing of the text of the statements type:

```
fin all,'write',n
```

The response would be:

```
110   180   220   350
```

---

[1]Throughout this manual, optional parameters will appear in brackets i.e., [,parm].

OTHER EDIT COMMANDS

EXTRACT

This command is used to extract one or more lines from a program. The lines that are not extracted are deleted. This command is the logical opposite of the DELETE command. The general form is:

```
EXTRACT line number,line number,...
    or
EXTRACT line number THRU line number,...
   ext 40 T 85
```

INSERT

This command is used to insert a specified line in the program currently in the user work area. The text enclosed in the single quotes is assigned a line number specified in the INSERT command and is inserted in numerical sequence within the current program. If multiple line numbers are specified, the new line number is inserted repetitively. The general form is:

```
INSert line number,line number,...,'text-of-line'
   ins 15,'read(5,*)x'
```

MOVE

This command extracts the single line or group of lines indicated by the second parameter of the command from their current location. It moves them to the position immediately following the position indicated by the destination line number. If an increment is specified, the moved line or lines are renumbered using the same increment but only as necessary to prevent overlapping of line numbers. If no increment is specified, a default of 1 is assumed. The general form is:

```
MOVE destin-line-number,line number [,increment]
        or
MOVE destin-line-number,line number T line number [,increment]
   mov 15,50
```

NAME

This command is used to assign a program name to a program in the work area. If the program already has a name it will be renamed. The form of the command is:

```
NAME progname
          nam  newtrial
```

RENUMBER

This command is used to renumber program lines. The new line number is assigned to the line previously identified by the old line number. All subsequent lines are renumbered using the increment specified. Renumbering cannot cause any lines not included in the renumbering operation to be overlapped.

One, two, or all of the parameters may be omitted. Defaults of 100, 0, and 10 are assumed for the new line number, old line number, and increment, respectively. A comma must be used to indicate an omitted parameter if any specified parameters follow.

The general form is:

```
RENumber  new-line-number,old-line-number,increment
   ren  500,100,5
```

USING SUBPROGRAMS

There are two ways to use subprograms under CALL/VS 1) write them directly attached to the main program; or 2) write them as

separate programs, save them, and MERGE them with the main program at run time.

Using the first alternative the program and subroutines would look like one source deck. For example:

```
10   X=0.
     :
     :
1000 END
1010 SUBROUTINE ONE
     :
     :
1080 RETURN
1090 END
1100 SUBROUTINE TWO
     :
     :
1250 END
```

To follow the second option or to use subroutines in one of the libraries, the merge command is necessary. The general form is:

```
MERge main-program,subprogram1[,line-number-before-insertion]
   [,subprogram2][,line-number-before-insertion]...
```

This command is used to incorporate one or more source programs into a main source program. The first subprogram is inserted into the main program after the line identified by the first typed line number, the second after the second line number and so on. If a line number is not specified, the subprogram is inserted at the end of the main program.

The size of a program created by the merge cannot exceed the maximum program size (600 source statements or 28,848 characters, whichever comes first).

Any source programs available to the user can be merged as long as they are in the same language. They may be in any available library. The subprograms must be in source.

To merge a program type:

```
mer  main,*one,two,**three
```

This would retrieve the subprograms *one, two, and **three and add them to the end of the program called MAIN. This collection of programs would be loaded into the work area. To execute type:

```
run
```

When writing a series of subprograms, remember to clear the work area after each one is saved or you will be writing on top of the one currently in the work area.

DATA FILES

Data files can be created in one of three ways:

1. Enter the data from the terminal with the mode of data.
2. Create a file with the FILE command and fill the file with output from a program.
3. Enter the data file on cards using the DIBCADBU utility.

Data files created from the terminal in the mode of data or by using the DIBCADBU utility will have line numbers. Only data files with line numbers can be edited using the CALL/VS edit comands. Data created by method 2 above will not have line numbers and therefore, cannot be edited by CALL/VS edit commands.

CREATING DATA FILES FROM THE TERMINAL

To begin, enter the data mode by typing:

enter data

To clear the work area then type:

cle

After the system responds "ready", begin entering the data by first typing the line number, leaving a blank space, then typing the data in the desired format.

```
10  15.5  10  12.5
20  25.2   8  25.9
      etc.
```

The line number is not part of the data. It is used to reference a data record. Once the data is entered, save the data giving the data file a name.

save datal

To later edit the data, bring the data file into the work area by issuing a load command:

load datal

Then edit the data using the same edit commands used to edit programs. Data created from the terminal in this manner is called program-data.

CALL OPEN AND CLOSE STATEMENTS FOR FORTRAN

To associate a data file with a program, use CALL OPEN and CALL CLOSE statements. In FORTRAN the CALL OPEN statement looks like:

CALL OPEN (n,'filename','INPUT' or 'OUTPUT')

where n is the device code for the read or write statement, 'filename' is the name of the data file, and 'INPUT' or 'OUTPUT' depends on whether the file is an input or output file.

Once datal has been created it can be accessed in a program. For example:

```
10  CALL OPEN (8,'DATA1','INPUT')
20  DO 5 I=1,10
30  READ (8,100) X,M,Z
40  100 FORMAT (F4.1,I3,F5.1)
50  WRITE (6,101) X,M,Z
60  101 FORMAT (' ',F4.1,5X,I3,5X,F5.1)
70  5 CONTINUE
80  CALL CLOSE (8)
90  END
```

Line number 10 is the CALL OPEN statement. It indicates that the file is to be read with device code 8 (the device code can be an integer variable), the filename is "datal" and it is used as an input file.

The CALL OPEN statement opens the file and positions the pointer at the beginning of the file.

Line number 80 is the CALL CLOSE statement. It is of the form

CALL CLOSE (n,m...) n,m,...are device codes.

The CALL CLOSE statement closes the file. It cannot be accessed again until a CALL OPEN is issued. Remember to close all files that have been opened, a maximum of 4 data files can open at any one time.

PROGRAM CREATED DATA FILES

This type of data is probably the most commonly used. Create the file itself with a FILE statement of the form:

FILe filename[,n]

where filename is the name to be associated with the data file and n is the maximum number of disk storage units to be associated with the file. Storage is allocated to a file in terms of storage units. A storage unit is 3440 bytes (characters). If n is not specified in the FILE statement, the default is 4 storage units. The number of units need not be specified at creation time as long as 4 units is sufficient. As the file grows, the FILE statement can be used to increase the number of units allocated to a particular file. For example:

fil data50,10

After the file is created, data can be put into it. The following program places data into the file, closes it, opens it, and reads it:

```
 10  CALL OPEN (9,'DATA50','OUTPUT')
 20  DO 5 I=1,10
 30  WRITE (9) I
 40  5 CONTINUE
 50  CALL CLOSE (9)
 60  CALL OPEN (9,'DATA50','INPUT')
 70  DO 55 I=1,10
 80  READ (9) J
 90  WRITE (6,*) J
100  55 CONTINUE
110  CALL CLOSE (9)
120  END
```

This program opens the file that was previously created named "data50". It associates it with device number 9. The DO loop increment is written out to this file. No format is necessary, although a format could have been used. In line 50 the file is closed. Line 60 opens the file as an input file. Line 80 reads the data and line 90 writes them on the printer. Line 110 closes the file.

If it is desired to reread a disk data file, it is possible to reset the file back to the beginning with a rewind statement. To rewind the file above, use the statement:

```
115 REWIND 9
```

<u>CREATING DATA FILES WITH DIBCADBU</u>

The DIBCADBU utility can be used to place data decks into a user's userid library. See the section on DIBCADBU to prepare the necessary header card. Bring the data deck to User Services who will run the utility and place the deck in the library. The DIBCADBU utility is a batch processor which can only run when CALL/VS is not active. Currently, we run DIBCADBU in the morning before CALL/VS comes up at 9 a.m.

FILE PROTECTION

It is possible to protect a file in the userid library from accidently being destroyed. The command is:

```
LOCk filename
```

This command locks the program or data file in the userid library. The file cannot be deleted, nor another file with the same named saved or stored in the library, without first removing the LOCK protection. If a data file is locked, it cannot be opened for output without UN-LOCKING. For example:

lock trial

To remove the protection, issue an UNLOCK command:

UNLock filename

To UNLOCK TRIAL type:

unl trial

The user may also wish to SECURE files. Issuing the SECURE command prevents any other user from copying the file using the DIBCADBU utility. The general form is:

SECure filename

To SECURE TRIAL type:

sec trial

To remove security issue a RELEASE command of the form:

RELease filename

To RELEASE TRIAL, type:

rel trial

If a file has been created using DIBCADBU, the SECURE attribute is set automatically.

The commands LOCK, UNLOCK, SECURE, and RELEASE apply to the userid library only. To protect files in the other libraries see the next section.

PLACING FILES IN SHARED LIBRARIES

A user may place a program or data file into the single star or double star libraries. Remember that the single star library is accessible by users having the same first four characters of the userid in common. The double star library is accessible to all users. To place a program in the single star library type:

```
POO1 *filename
```

To place it in the double star library type:

```
POO1 **filename
```

The filename must currently reside in the user's userid library to be pooled. The filename is 1-8 characters not counting the asterisks.

To POOL TRIAL in the double star library, type:

```
poo **trial
```

To remove a pooled file, PULL it. The command form is:

```
PUL1 *filename
    or
PUL1 **filename
```

To PULL TRIAL from the double star library, type:

```
pul **trial
```

Only the userid that POOLed the file can PULL it. This allows perfect protection provided the userid and password are kept a secret.

A user can flag a program to be "run only" -- that is, not capable of being listed, saved, or stored -- by PROTECTing it. The command is:

```
PROtect filename
```

UPDATE OCTOBER 1, 1975

POOLING IN THE DOUBLE STAR LIBRARY

If a user wishes to POOL a file into the double star library, permission must be first obtained from User Services. To POOL, fill out the appropriate form with User Services Data Controller located in Administration 124. This restriction is necessary to control the size of the library and to assist in making available valuable user-supplied programs to the user community.

This restriction does not apply to the single star library.

NOTE: No asterisks preceed the name. To PROTECT TRIAL, type:

pro trial

To remove the PROTECTion, issue an ALLOW command of the form:

ALLow filename

Again no asterisks are in the filename. This ALLOWs other users to list, save, or store the file. They still cannot alter it. To ALLOW TRIAL, type:

all trial

OTHER COMMANDS

CATALOG

It is possible to take a closer look at the userid library than the one taken earlier in this manual. Give the command:

```
cat all

10:34    04/24/75   THURSDAY
```

FILE NAME	TYPE	LANGUAGE	PROGRAM SIZE	FILE UNITS	DAYS SINCE USED
CWR1	PROG	FORTRAN	162		0
CWR50	PROG	FORTRAN	162		3
TRIAL	PROG	FORTRAN	85		0
TRIALO	OBJ	FORTRAN		3	0
DATA50	PROG	DATA	39		0
DAT10	DATA	FORTRAN		1	0
/CWR1	OBJ	FORTRAN		4	0

RW1, CWR50, and TRIAL are PROGrams written in FORTRAN. The program size tells us the number of characters each takes. Remember the maximum size is 28,848 characters. TRIALO is stored in OBJect form

from source written in FORTRAN. It takes three file units to store it. It is more efficient in disk storage to save source code than to store object programs. It is more efficient to execute from object than from source code. DATA50 is program-data created by entering data in the data mode from the terminal. DAT10 is a data file used by a FORTRAN program. It was created with a FILE statement. It has one file unit. File units will be added as the file grows up to a maximum of 4. When four file units are reached, the file size must be increased using the FILE command. /CWR1 is an object program created by issuing a STORE command when CWR1 was in the work area. If a name is not used with the STORE command, it will take the name of the program currently in the work area and add a / to the front of the name. The / counts as one of the eight characters permitted in a file name. TRIALO was created with the statement:

store trialo

when TRIAL was in the work area.

/CWR1 was created with the statement:

store

when CWR1 was in the work area.

Information can be obtained concerning the contents of the starred libraries. Type cat followed by a blank and then one, two, or three asterisks.

WIDTH

This command sets the width of a line to be used for printing information at the terminal. It is used only if the line width desired for listings or output is other than 72 print positions, which is the CALL/VS default. The effective line widths for terminals are:

```
2741         130 positions
Teletype      72 positions
Execuport     80 positions
```

To change the line width give the command:

```
width 130
ready
```

If a line width greater than the effective maximum is given, the excess characters will be over-printed in the last valid column.

OFF

To logoff the system type:

```
off
OFF AT 9:18
PROC TIME     0 SEC.
TERM TIME     3 MIN.
```

Then turn off the terminal and hang up the phone.

THE DIBCADBU UTILITY

It is possible to place programs or data files into a userid library using the DIBCADBU utility. The utility is run by User Services once a day. The utility cannot be used when CALL/VS is running.

INSERT/REPLACE Function Statement

The INSERT/REPLACE function statement specifies the operations to be performed. The specific options available with the INSERT/REPLACE function are described below.

```
|1-2| Mnemonic  |      Parameters
|---+-----------+------------------------------------------------
|./ |  INSERT   | USER={aaanmm|SYSLIB|**LIB},
|   |    or     |
|   |  REPLACE  | [USR2=aaanpp,]CLUSTER=k,
|   |           |
|   |           | [FROMUSER={bbbrqq|SYSLIB|**LIB},]
|   |           |
|   |           | [FROMCLUS=j,]
|   |           |
|   |           | [INPUT={CARD|OSDS|DISK|TAPE},]
|   |           |
|   |           | [LANG={BASIC|FORTRAN|PL/I|DATA},]
|   |           |
|   |           | PASSWORD=xxxxxxxx,[USERPASS=yyyyyyyy,]
|   |           |
|   |           | [FILE={PROG|DATA|BOTH},]
|   |           |
|   |           | [NAME={filename|xxxxxxx.|(ALL)},]
|   |           |
|   |           | [RENAME={newname|yyyyyyy.},]
|   |           |
|   |           | [MARG=(mm,nn),]
|   |           |
|   |           | [LINEGEN={SEQ,xxxxx},][LINEINC=xxxxx,]
|   |           |
|   |           | [OPTIONS=([SEQ,][LIST,][UNLOCK,][LOCK]
|   |           |          [LONG,][PROTECT,][*,][**,]
|   |           |          [OBJECT,][FORMDATA,][VAL]),]
|   |           |
|   |           | [SPACE=sss]
```

Note: {} - select one from enclosed list
[] - indicates optional parameter

To place a FORTRAN program called TRIAL existing on cards in the userid library SUS101, password = UI, the card would look like:

```
./ INSERT USER=SUS101,CLUSTER=1,LANG=FORTRAN,
./ PASSWORD=UI,NAME=TRIAL
```

Blanks appear only after the ./ and after the word INSERT. No other blanks can appear except after the last comma on the first card. Columns 1 to 71 are available. Column 72 must contain a blank.

To place a program data deck in your userid library, obtain a source deck, put on a header card similar to the one above and bring it to User Services.

If your program is on any other medium than cards or you wish to do anything else, please consult User Services.

The DIBCADBU utility will provide line numbers for your programs automatically.

CALL/VS LANGUAGES

CALL/VS FORTRAN

If a FORTRAN statement cannot be completed on one line, it can be continued on one or more continuation lines. A statement is identified to be continued if the last nonblank character in the line is either a % or a - (hyphen). The next line is the continuation line. For example:

```
100  X=(Y+Z)/(A+C)/%
110  (Q+50.)
```

Line 110 is a continuation of line 100.

The program may contain COMMENT statements. To enter a COMMENT statement, type the line number, a blank, then " followed by the comment. For example:

```
150 "THIS IS A COMMENT STATEMENT
```

It is not necessary to close the statement with ".

It is possible to CHAIN two programs together. The execution of the CHAIN statement causes another program to be loaded into the work

area and executed. The CHAIN statement also allows a 16 byte variable to be passed to the chained program. A CALL PARM statement is needed in the chained program to receive the variable. The form of the CHAIN statement is:

CALL CHAIN (progname [,parameter])

"progname" is a variable or literal constant identifying an eleven-character program name (the first one, two, or three characters may be asterisks if the program is accessed via a shared library). "Parameter" is optional; if supplied, it is a variable or literal constant to be passed as a 16-byte parameter to the chained program. If "parameter" is omitted, the literal constant 'NULLNULLNULLNULL' is passed to the chained program.

The CALL PARM statement is of the form:

CALL PARM(y)

"y" is a variable identifying an area at least 16 bytes in length, which upon return from PARM, will contain 16 bytes of data passed to this program from the chaining program.

The following example illustrates the use of chaining. The first program is CHAIN1

```
10 CALL OPEN (8,'CHAINTRY','OUTPUT')
20 DO 5 I = 1,10
30 WRITE(8) 1
40 5 CONTINUE
50 CALL CLOSE (8)
55 CALL CHAIN ('CHAIN2','CHAINTRY')
60 END
```

It opens a file named 'CHAINTRY', writes into it, closes it, and in line 55 calls a program named 'CHAIN2' and passes to it the name of the data file, 'CHAINTRY'.

CHAIN2 appears below:

```
5 CALL PARM('CHAINTRY')
10 CALL OPEN (9,'CHAINTRY','INPUT')
20 DO 5 I = 1,10
30 READ (9) J
40 WRITE(6,*) J
50 5 CONTINUE
60 CALL CLOSE(9)
70 END
```

Line 5 receives the file name from CHAIN1 using the CALL PARM statement. In this example the parameters are literal constants; they could have been variables.

The command:

```
run chain1

CHAIN1         9:35  05/02/75  FRIDAY

1
2
3
4
5
6
7
8
9
10
STOP
TIME 0 SECS.
```

caused CHAIN1 to be executed which in turn caused CHAIN2 to be executed. After execution CHAIN2 resides in the work area.

The following features are not available on CALL/VS FORTRAN:

1. The BACKSPACE statement

2. The DOUBLE PRECISION statement (REAL*8 is supported)

3. The ENTRY statement

4. The IMPLICIT statement

5. The NAMELIST statement and NAMELIST input/output

6. Labeled COMMON and BLOCK DATA subprogram

7. Logical data, constants, variables, operators, expressions, functions, or declarations. (Logical IF statements are supported.)

8. Z (hexidecimal) and L (logical) codes in FORMAT statements.

9. Direct access input/output statements:

   a. DEFINE FILE
   b. READ (u'r,f,ERR=s) list
   c. WRITE (u'r,f) list
   d. FIND (u'r)

10. FORTRAN II input/output statements

11. The following FORTRAN -- supplied subprograms:

    a. DUMP
    b. PDUMP
    c. SLITE
    d. SLITE7

12. The debug facility

13. OS job control facilities

Refer to CALL/OS FORTRAN Language Reference Manual GH20-0710 for further information about CALL/VS FORTRAN.

CALL/VS PL/I

The following is a list of some of the facilities excluded from the CALL/VS PL/I Language:

1. Record I/O is not supported.

2. Stream I/O is supported with a restricted set of attributes.

3. Dynamic storage allocation is restricted.

4. The BIT, PICTURE, and GENERIC attributes are not supported.

5. Structures are not supported.

6. Condition prefixes are not supported.

11. The BINARY functions are not supported.

12. The ON-conditions are restricted.

13. Extended precision is not supported.

14. Initialization of data is not supported.

15. LABEL lists are not supported.

To write a program type:

```
cle
```

to clear the work area and then:

```
enter pl/i
```

to enter the PL/I language mode. Then enter the statements by typing the line number and the statement (only one statement per line).

```
10 a: procedure;
20 x = 0.;
30 do i = 1 to 5;
40 get list (y);
50 x = x + y;
60 end;
70 put list (x)
80 end a;
```

```
run

                  10:02  05/02/75  FRIDAY

V8
V78
V.06
V5.8
V67
 1.58859E+02
TIME 0 SECS.
```

The PL/I expression to open a file is:

OPEN FILE(filename)TITLE('disk-file-name')INPUT or OUTPUT;

The filename is the name of the file to be opened. It is the filename used by the program. The 'disk-file-name' is the name given to the disk file created in the FILE statement. If the program file name and the disk file name are identical, the OPEN statement can simply be:

OPEN FILE(filename)INPUT or OUTPUT;

Use INPUT or OUTPUT to specify the desired option. If INPUT or OUTPUT is omitted, INPUT is assumed. The form for the CLOSE statement is:

CLOSE FILE(filename);

A file should be closed when it is no longer needed. For example:

CLOSE FILE(MASTER);

The PL/I CHAIN statement has the form:

CALL $CHAIN(name [,data])

where "name" is the name of the program to be invoked and "data" is a character argument to be passed to the chained program.

To reset disk input and output files use the $RESET subroutine. The form is:

```
CALL $RESET (filename[,filename,..])
```

For input disk files, the file is reset to the start of the file. For output files, the current half-track of data in the output buffer is written to the disk, and the file is reset to the start of the file.

For more information about CALL/VS PL/I see "CALL/360 - OS PL/I Language Reference Manual", GH20-0700.

CALL/VS BASIC

The CALL/VS BASIC language is based upon the BASIC language originally developed at Dartmouth College. CALL/VS BASIC extensions include:

1. Specification of short-or long-form arithmetic
2. Three intrinsic constants: pi, the natural number e, and the square root of 2
3. Precise control of printed output via format pictures
4. Program branching using computer GOTO statements
5. Data file storage

All arithmetic computations in BASIC are performed on floating-point numbers. A floating point number is a machine approximation of the value of a real number.

A CALL/VS BASIC program may be compiled and executed using either short-form arithmetic or long-form arithmetic; the mode is specified via the ENTER command. ENTER BASIC specifies short-form floating point computations, while ENTER BASICL specifies all computations are to be performed in long-form floating point arithmetic. The long-form computations will be more accurate, but they will also require more machine time to compute.

The following is an example of a program written in BASIC:

```
10 x = 0.
20 for i = 1 to 5
30 input y
40 x = x + y
50 next i
60 print 'x = ' x
70 end

run

          9:50  05/02/75  FRIDAY

V689
V5.0
V56
V123
V.009
X =  873.009

TIME 0 SECS.
```

To use disk files it is necessary to use CALL OPEN and CALL CLOSE statements.

The general form of the OPEN statement is:

OPEN u,f,INPUT or OUTPUT

where u is a file number (expression) and f is a file name (alphabetic variable or literal constant).

This statement causes the data file or program-data file named by f to be assigned to the file number specified by u. INPUT or OUT-PUT must be specified. For example:

```
100 OPEN 1,'MASTER',INPUT
```

When processing of the file is complete, the file should be closed. The general form is:

```
CLOSE u or f
```

where u is a file number (expression) and f is a file name (literal constant).

This statement causes the data file or program-data file specified by the file number u OR file name f to be closed. For example

```
120 CLOSE 1    or
120 CLOSE 'MASTER'
```

More than one file can be closed by a CLOSE statement. Separate the names of the files with commas.

To reset a disk file back to the start use a reset command of the form

```
RESET (u or f)
```

where "u" is a file number and "f" is a filename.

For more information about CALL/VS BASIC, consult "CALL-OS BASIC Language Reference Manual" GH20-0699.

EZSTAT

EZSTAT is a utility statistical package designed to be run interactively on small samples. The programs have been developed using CALL/VS BASIC. To use EZSTAT the individual should be aware of the operational procedures for the terminal and time-sharing support system.

EZSTAT is composed of several programs, each designed for the statistical analysis of small samples. Services are provided for:

Program Name	Program Function
DFB	File Building
DFE	File Editing
DFT	Variable Transformation
XTAB	Cross Tabulations
HIST	Histograms
DESCR	Data Description
TTEST	T-Test
CANON	Canonical Correlation
ONEWAY	One Way Analysis of Variance
KWALLIS	Kruskal-Wallis AOV
KRANK	Kendall Rank Correlation
WMP	Wilcoxon's Match -- Paris Signed -- Ranks Test
COCHRAN	Cockran Q Test
FRIEDMAN	Friedman Two Way Analysis of Variance
MANN	Mann Whitney U Test
KENDALC	Kendall Coefficient of Concordance
BISERIAL	Biserial Correlation
POINTBI	Point Biserial Correlation
MOVAVE	Moving Average
SEAS	Seasonal Analysis
CYCLICAL	Cyclical Analysis
TRIPLE	Triple Exponential Smoothing
CHI	Chi Square
BICOR	Bivariate Correlation
LREG	Least Squares Regression
STEPWISE	Stepwise Regression
MLR	Multiple Linear Regression

Program Name	Program Function
POLYREG	Polynomial Regression
DISCRAN	Discriminant Analysis
FACTOR	Factor Analysis
CORR	Correlation
SIGN	Sign test
MERGE	File Merge Faculty

All the above programs are in the triple star library and should be preceded with three asterisks. For example; to run DFB, type:

run ***dfb

The user should be knowledgeable in the area of statistical analysis attempted. Proper application of analytical techniques and interpretation of the results is not an intrinsic matter.

Each program in EZSTAT is designed to accept data from a pre-built file. Descisions regarding options and analysis are offered at execution time. Data is presented to the program in a standard format. Up to two hundred observations of up to twenty variables can be analized. These data must be entered into a file using the Data File Build or equivalent routine.

The conceptual approach of EZSTAT is the following:

1. Data is collected and decision on necessary analysis is made.
2. User allocates space for file of data. (Under CALL/VS an allocation of five units is necessary.)
3. Data file is build using DFB.
4. Editing of file is performed if necessary.
5. Transformations are performed if necessary.
6. Statistical analysis is run.
7. Results studied -- if further work is necessary, a return to step four is made.

While the approach of EZSTAT is attractive to the non-computer oriented individual, it can provide difficulties if applied incorrectly.

The casual user is urged to study his problems carefully before embarking on solutions. This package is designed for the statistical analysis of small samples. Large problems should be handled using more sophisticated, batch oriented packages.

A SAMPLE EZSTAT SESSION

The first step is to create a file to be used with the DFB data file builder. To create a file called "EZTRY":

```
file eztry,5
```

NOTE: The file must be given 5 file units regardless of the size of the input file. Then build the data file by executing ***DFB.

```
run ***dfb

DFB      9:33    05/05/75  MONDAY

DATA FILE BUILDER
ENTER DATA AN OBSERVATION AT A TIME.
UP TO 20 VARIABLES CAN BE USED.
UP TO 200 OBSERVATIONS ARE ALLOWED.
HOW MANY VARIABLES DO YOU HAVE?
V3
HOW MANY OBSERVATIONS DO YOU HAVE?
V5
WHAT IS THE NAME OF THE FILE YOU HAVE ALLOCATED?
Veztry
INPUT ROW          1
V3,5,6


INPUT ROW          2
V9.8,4,6


INPUT ROW          3
V78,3,5


INPUT ROW          4
V6,8,2
```

```
INPUT ROW              5
V7,3,5

DO YOU WANT TO ALTER THE DATA FILE?
Vno

TIME 1 SECS.
```

Once the input file is created any of the other EZSTAT programs can be run against the file.

On the following page are two examples.

```
run *** descr

DESCR          9:36    05/05/75   MONDAY

DATA DESCRIPTION FACILITY
WHAT FILE DO YOU WANT TO PROCESS?
?eztry
VARIABLE       MEAN        MAXIMUM      MINIMUM       RANGE       VARIANCE  ST. DEV.     ST.ERR.ME
    1          29.7600     78.0000       3.0000      75.0000    1029.7879    32.0903      14.3512
    2           4.6000      8.0000       3.0000       5.0000       4.3000     2.0736       0.9274
    3           4.0000      6.0000       2.0000       4.0000       2.7000     1.6432       0.7348

TIME 1 SECS.




run***corr

CORR           9:37    05/05/75   MONDAY

LINEAR CORRELATION COEFFICIENT MEASUREMENT
WHAT FILE DO YOU WISH TO USE?
?eztry
WHICH TWO VARIABLES ARE TO BE CORRELATED?
?1,2
 CORR. COEF. FOR  1 AND  2 IS -.45188
COVARIANCE IS      -30.07
DO YOU WANT ANOTHER COEFFICIENT?
?yes
WHICH TWO VARIABLES ARE TO BE CORRELATED?
?2,3
 CORR. COEF. FOR  2 AND  3 IS -.76306
COVARIANCE IS      -2.6
DO YOU WANT ANOTHER COEFFICIENT?
?no

TIME 1 SECS.

off
OFF AT  9:38
PROC TIME    2 SEC.
TERM TIME    5 MIN.
```

For more information about EZSTAT, consult the EZSTAT User's Guide.

CALL/VS MANUALS

More information about CALL/VS can be obtained from the following manuals:

GH20-0787	CALL-OS TERMINAL OPERATIONS MANUAL
GH20-0699	CALL-OS BASIC LANGUAGE REFERENCE MANUAL
GH20-0700	CALL/360-OS PL/I LANGUAGE REFERENCE MANUAL
GH20-0710	CALL-OS FORTRAN LANGUAGE REFERENCE MANAUL
GH20-0786	CALL-OS EXECUTIVE AND UTILITIES PROGRAM DESCRIPTION MANUAL

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A GUIDE TO THE USE OF HISARS

A Hydrologic Information Storage and Retrieval System

Myron Molnau

DEPARTMENT OF
AGRICULTURAL ENGINEERING

Agricultural Experiment Station

UNIVERSITY OF IDAHO

College of Agriculture

The State is truly our campus. We desire to work for all citizens of the State striving to provide the best possible educational and research information and its application through Cooperative Extension in order to provide a high quality food supply, a strong economy for the State and a quality of life desired by all.

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This work was supported by the Idaho Agricultural Experiment Station and by the Idaho Water Resources Research Institute under project A-045-IDA.

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PREFACE

The HISARS system was implemented out of a need to have a large body of hydrologic data available for ease of access. Many people have collected information for a project. Often the finding and collection of the necessary data, even when published, takes an inordinate amount of time when compared to the necessary analysis. Since much of the hydrologic data is in published form, the real need was for an efficient storage and retrieval system.

A search of available systems led to the adoption of HISARS, developed at North Carolina State University by E.H. Wiser. In this system the data are stored on a magnetic disk pack and the data retrieved by the Indexed Sequential Access Method (ISAM). The data elements currently supported are listed in Section I.B.2.

It should be emphasized that almost all of these data have been obtained from governmental agencies such as the National Weather Service and the Geological Survey. Because of the very large amount of data in this system, no attempt has been made to check the records which are assumed good until proven otherwise. For any critical use, the user is advised to check against the original published records. It would still be advantageous to use HISARS, even in that case, since no keypunching and additional checking would be required. In case any errors or omissions are found, please notify the author so changes can be made.

This manual is organized into three section; the ACCESS facilities, the PROCESS facilities and the COPY facilities. The ACCESS facilities merely allow a user to obtain listings of data in a standard format. These are described in detail in Section I.D.

The PROCESS facilities (see Part II) allow routine types of analyses on the data. These are relatively standard types of programs. The COPY facility allows the user to copy data from the disk pack and store it on a private tape or data set where it will be used as input to a user written program (see Part III).

This user's guide to HISARS has been patterned after the Guide published by North Carolina State University. The help of Ed Wiser in implementing this system at Idaho is gratefully acknowledged. Comments about HISARS are solicited from users, whether they be about these Guides or the files. Any comments should be directed to the author.

Since this is a new system and additions are contemplated for the data files and processing program, an updating list will be maintained for those who request this service. Also any user who has data that may be useful to others is urged to consider adding it to HISARS. Please contact the author for the proper procedures.

I. HISARS USERS' GUIDE: THE ACCESS FACILITIES

A. INTRODUCTION

The access facilities of HISARS are designed to provide copies of data in a convenient form. These are merely listings of available records or listings of data.

The following shows some examples of use of the access facilities to obtain listings of indexes and data.

Example 1. To obtain a list of all stations in Idaho and Lewis counties that have rainfall data available.

```
ACCESS
ELEMENT        RAINFALL
COUNTY         IDAHO LEWIS
LIST           INDEX
```

Example 2. To obtain a printout of the daily rainfall records for Potlatch, Idaho, and streamflow records for the Palouse River at Potlatch, Idaho.

```
ACCESS
ELEMENT   RAINFALL   STREAMFLOW
STATION   107301     13345000
LIST   DAILY   10
```

B. COMMAND LANGUAGE SPECIFICATIONS FOR THE ACCESS FACILITIES

The following commands constitute the access facility of HISARS:

```
ACCESS
ELEMENT      opl
STATION      opl
LOCATION     opl
BASIN        opl
REGION       opl
COUNTY       opl
ELEVATION    opl
AREA         opl
ALTERNATE    opl
PERIOD       opl
LIST         opl
COPY         opl
AND
OR
```

The command word is punched starting in Column 1, followed by at least one blank before the operand opl (if any). It is preferable for checking to start the operand in Column 11, but this is not required.

If more than one operand is required for a given command, there are three optional forms:

a) Several operands may be punched on a single card, separated by 2 or more blanks. Each operand must be complete, i.e. continuation of an operand from one card to the next is not possible.

b) Operands may be punched on consecutive cards, leaving at least one blank column preceding the operand. Thus, any cards with Column 1 blank are assumed to contain operands that are associated with the last control word.

c) The command itself can be repeated, with a different operand on each card. In this case, they do not even have to be consecutive.

A group of command cards constitutes a single access request. A group is always begun by an ACCESS card, followed by additional command cards in any order, provided only that at least one ELEMENT card is included. A group is terminated by an end of file card, an ACCESS card beginning another group or a PROCESS card signalling processing of the data just accessed.

There is no limit to the number of command cards included in a single group. Thus, a large number of stations, counties, etc. could be accessed as a single group. Any number of groups may be

stacked for a single run, and this is encouraged for efficiency. However, excessive stacking of groups will increase total job time and lead to possible job cutoffs.

1. ACCESS

The ACCESS command signals the beginning of a group of command cards constituting a single access request. The ACCESS command must always be the first card in a group. Anything else punched in the card following the word ACCESS will be ignored. This is a convenient location for comments.

2. ELEMENT

The ELEMENT command identifies the element or elements for which access is requested. The operand must give the element in one of the standard forms. The following elements are included in the current implementation:

a) STREAMFLOW
b) RAINFALL
c) TEMPERATURE
d) EVAPORATION
e) SNOWFALL
f) EVENT
g) PEAKFLOW
h) HOURRAIN

Any number of elements can be given for a single access request. The temperature command is also used to obtain evaporation pan water temperature as explained later in the section on control cards, Section I.E.

3. STATION

The STATION command is used to request access to specific stations. Standard agency codes are used, except that only the numbers (without punctuation) are permitted.

The 8-digit code of the U.S. Geological Survey is used for the Streamflow and Peak Flow files. To access data for Station 12.1695.00 the operand must be formatted as 21169500.

The 6-digit codes of the National Weather Service is used for the Rainfall, Temperature, Evaporation, Snowfall and Event files. To access data for station 10-6152 the operand must be formated as 106152.

4. LOCATION

The LOCATION command is used to request access for stations in a geographic region called a geographic location block.

A 4-digit number defines each 1-degree quadrangle, specified by the latitude and longitude, respectively, of the southeast corner. (If the longitude exceeds 100, only the last two digits are used.) This quadrangle may then be divided into four 30-minute quadrangles number 1, 2, 3 and 4 taking in order the SE, SW, NW and NE quadrants. Each quadrangle thus obtained may in turn be subdivided repeatedly until the desired accuracy is obtained. HISARS uses a 10-digit code to define locations in storage. This is sufficient to define an area 60/64 minutes square or approximately one square mile (see Fig. A 1).

The operand for the LOCATION command may contain from 1 to 10 digits, referring to all stations which start with the same group of digits. If for example a 6-digit location code 451634 were used, all stations would be accessed in the 15-minute quadrangle bounded on the south by 45° 45' and on the east by 116° 30'. Similarly, a 1-digit code 4 would result in access to all stations between 40° and 50° latitude, regardless of longitude.

This page is left blank.

Figure A 1. Location codes as used in HISARS

5. BASIN

The BASIN command identifies requests by river basin. The codes being used are those used by the National Weather Service. Figure A 2 shows the river basin codes for Idaho.

Future plans call for a more detailed breakdown by sub-basins but this has not been implemented yet.

6. REGION

The REGION command identifies requests by climatological region. The code used is a two character code devised by the National Weather Service (See Figure A 3).

7. COUNTY

The COUNTY command is used to access stations by county. The operand consists of a string of one or more characters. All stations are retrieved which have the same character string in the name of the county. Unlike other comparisons, however, the string does not have to occur at the beginning of the county name, but can occur anywhere in the name. Thus, for example, for the operand BO all stations in BOnner, BOise, BOundary and CariBOu counties would be accessed.

8. ELEVATION

The ELEVATION command is used to access stations within a given range of elevations. The operand is given in the form MIN TO MAX. For example, the command card ELEVATION 2000 TO 2500 will access all stations between 2000 and 2500 feet elevation. Stations with elevations equal to either the upper or lower limit will be included.

The format of the operand is quite free, the only requirement being at least one blank between the two limits. The limits can also be punched with a decimal point, and several decimal places if required. Thus the operand 2000.00 2500.0 will produce the same results as the example above.

If only a lower limit is desired, only a single limit need be given. A default upper limit of 100,000 feet will be supplied automatically.

For certain stations, the elevation may be unknown or irrelevant, and the elevation in the index will be left blank. These blank values are not interpreted as zeros, and such stations cannot be accessed using the ELEVATION command.

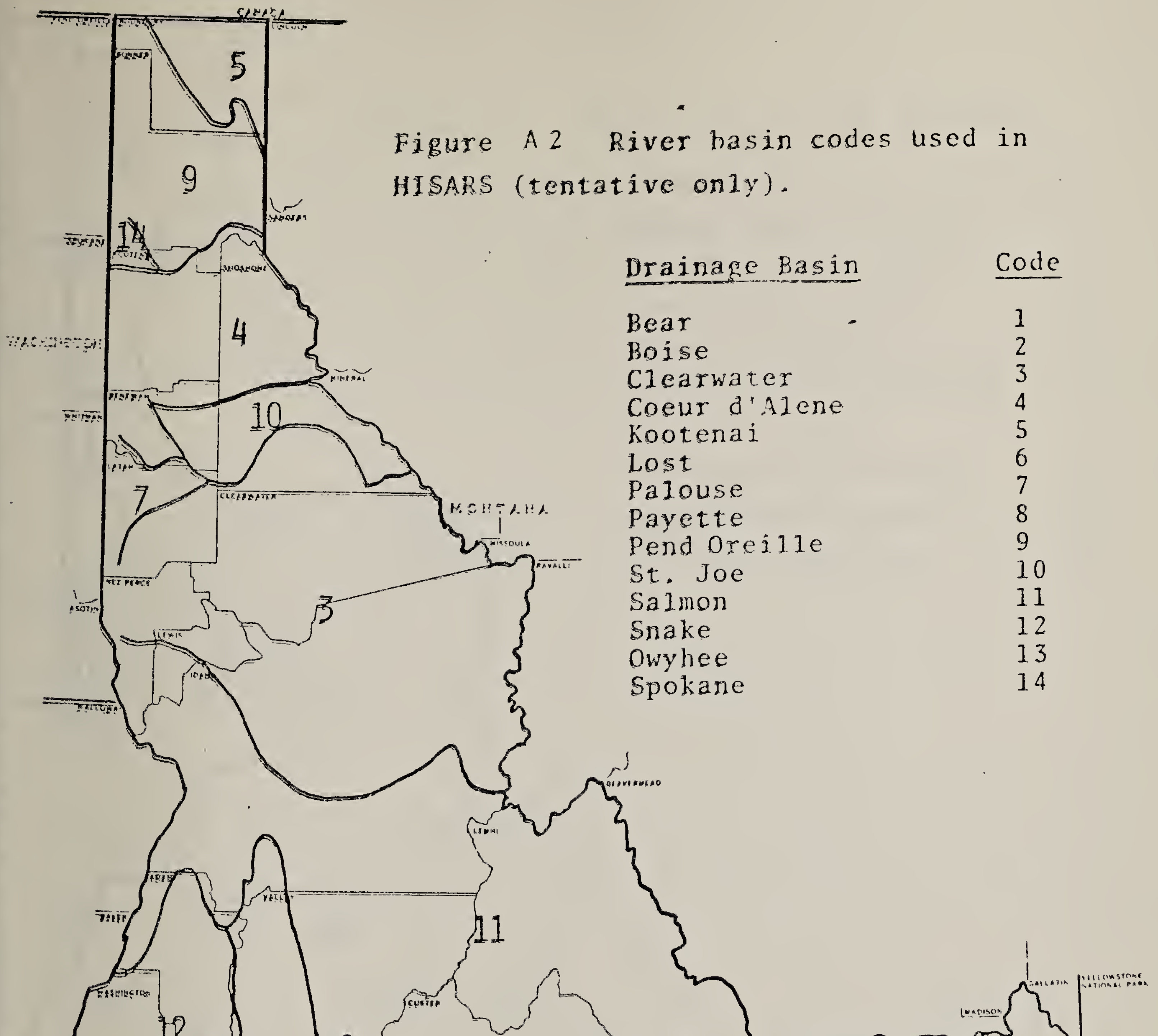
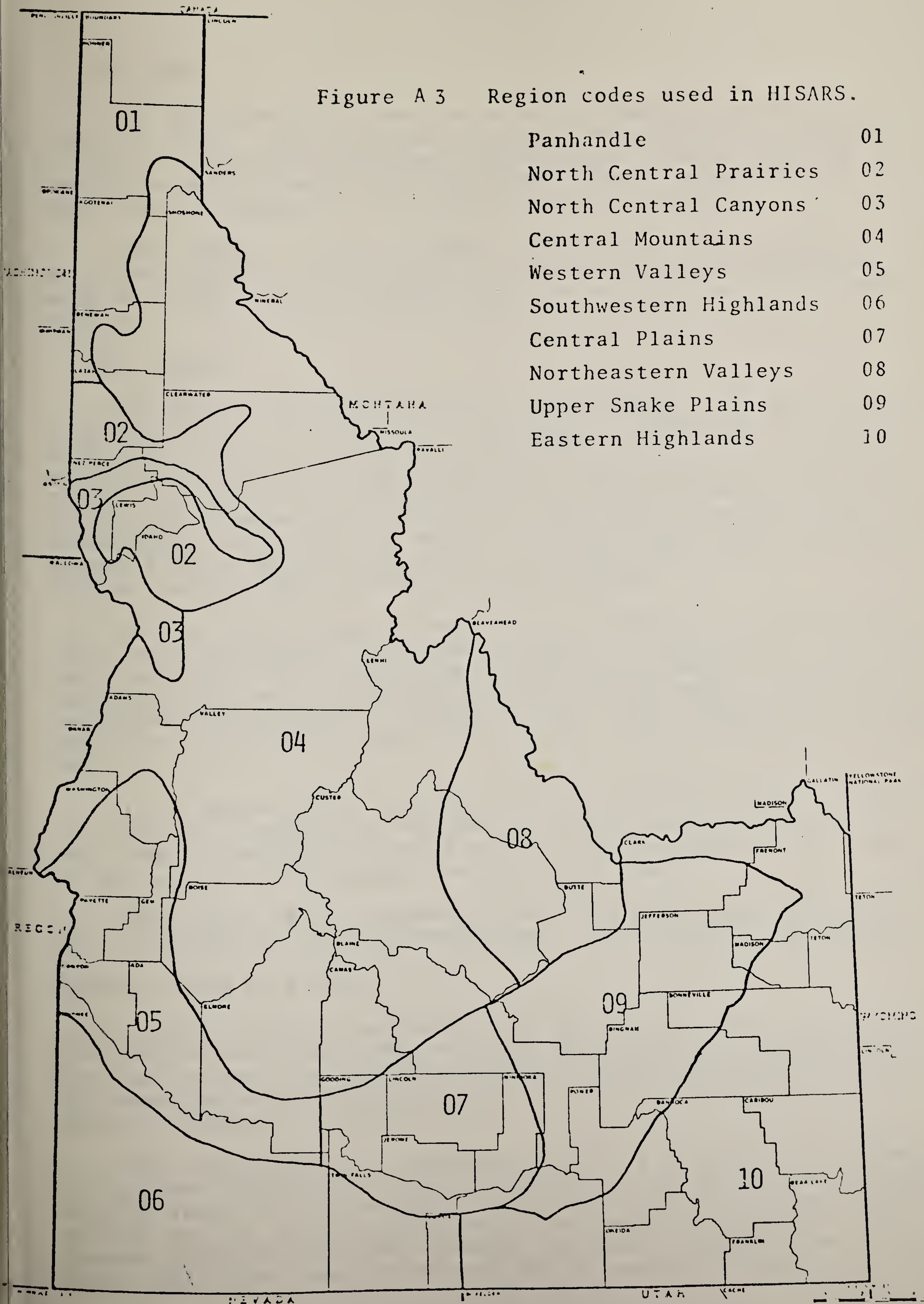


Figure A 2 River basin codes used in HISARS (tentative only).

Drainage Basin	Code
Bear	1
Boise	2
Clearwater	3
Coeur d'Alene	4
Kootenai	5
Lost	6
Palouse	7
Payette	8
Pend Oreille	9
St. Joe	10
Salmon	11
Snake	12
Owyhee	13
Spokane	14

Figure A 3 Region codes used in HISARS.

Panhandle	01
North Central Prairies	02
North Central Canyons	03
Central Mountains	04
Western Valleys	05
Southwestern Highlands	06
Central Plains	07
Northeastern Valleys	08
Upper Snake Plains	09
Eastern Highlands	10



9. AREA

The AREA command is used to access streamflow stations by drainage area. The format and usage of the operand is identical to that of the ELEVATION command given above, except that the limits are of drainage areas in square miles. Again, if only a lower limit is required, a single limit is sufficient.

Blank values are more common for drainage areas. These occur for springs, and for stations with varying drainage areas such as swamps. Such stations cannot be accessed using the area command.

10. PERIOD

The period for which records are included in the data files is recorded in the associated index file. Since records for most files are stored by month, the beginning and ending of a period of record is stored by year and month. Each period which is complete, but which is preceded and followed by a missing month, is defined as a period of record, and is indexed by beginning and ending dates and length in months. Up to 100 such periods can be accessed for a single station; if there are more, only the last 100 are indexed and accessible by the system.

For the files which contain data obtained at irregular intervals, such as snowfall, the index assumes a single period of record, with the first and last months being the months in which the first and last days of record occurred. The number of months is replaced by the number of records in the file. There is no way to tell from the index whether the record is complete during the period.

If an access group is given without a PERIOD command, the entire period of record is accessed for every station included by the group. The PERIOD command may be used to restrict the length of period for which records are to be accessed.

The format of the operand is BEGIN TO END, where BEGIN and END are months in the form Month/Year. For example, the command

PERIOD 6/1939 TO 12/1940

would limit access to records in the period June 1939 to December 1940 inclusive. The format requires the slash ('/') immediately preceded by month and followed by year without intervening blanks. The same format is required for BEGIN and END but spacing and words in between are irrelevant.

For some purposes, a complete period of record may be required. If the word COMPLETE is added at the end of the preceding operand, with at least one intervening blank, only stations having complete records for the entire period specified will be accessed. This feature could be used, for example, to obtain averages for all stations which have complete records for a specific period.

11. LIST

The LIST command directs the system to produce certain listings of the accessed data. The following operand are permitted:

a) INDEX
b) MONTHLY
c) DAILY
d) HOURLY
e) CONTENTS

The INDEX operand indicates that a listing of the index is to be produced. The MONTHLY and DAILY operands indicate that data are to be listed for the specified time periods.

Listings of monthly values for several of the elements normally include such summary information as annual totals, monthly and annual averages for the period, and the ratio of the annual total to the annual average for each year with complete records. In order to print the ratios in a convenient format, the data are actually read twice. If the ratios are not required, the word PARTIAL may be added following the operand MONTHLY. Thus, the command LIST MONTHLY PARTIAL will produce listings, complete except for ratios, at noticeably less cost and should be used whenever possible.

Detailed formats of output listings are given in Section I.D. The LIST command has one option. This is the month for which the listing is to begin. For example, LIST MONTHLY 6 will list the year with June as the first month. LIST DAILY 10 will list one year's data beginning on October 1. This is most useful for streamflow files where a wateryear listing rather than a calendar year list is desired. Default is 1 except for snowfall files where default is 7.

12. COPY

The COPY command is provided to permit users to copy records from the HISARS data files to other formats, for use with other languages. Since HISARS files are not accessible to FORTRAN and COBOL,operands provide for conversions appropriate to these languages. This feature is discussed in detail in Part III, the Users' Guide to the Copying Facilities.

13. AND or OR

The AND and OR commands are not strictly commands, but are control words for the And/Or option. This option is described in Section I.C.2 below.

C. ACCESS COMMAND OPTIONS

Several options are permitted beyond the standard specifications described in the previous section. The options are designed to permit either extension to the access facilities or simplification of the command format.

1. The complete file option

For certain uses of the system it may be desirable to access the entire file. For example, the user may wish to obtain an index of all records in the files.

This option is obtained by using only an ACCESS card, an ELEMENT card with the requested element or elements as operands, and appropriate LIST cards as required. No other command cards are permitted.

When this option is used, the entire file is scanned, and entries for each station in order are processed as requested. Since such processing may be unacceptably extensive, only limited operations are permitted. For example, operands for the LIST command of INDEX and MONTHLY are permitted, but DAILY is not.

2. The AND/OR option

The regular access facilities permit retrieval of records that satisfy one or more criteria. For example, if the command cards

```
BASIN  06
       07
COUNTY BONNER
```

are used, then all stations that are either in Basin 06 or in Basin 07 or in Bonner County will be accessed. Note that the word OR is used in the logical sense.

OR command cards could be inserted between the command cards above, without changing the results. These cards are therefore without function to the system, but may help the user to recognize the logic of the retrieval request.

The AND command introduces the requirement that in addition to preceding criteria, the following criterion must be met. For example, if the command cards

```
BASIN 06  07
COUNTY BONNER
AND
ELEVATION 2000
AND
AREA 0 to 500
```

are used, all stations that are either in Basin 06 or in Basin 07 or in Bonner County and having elevations over 2000 feet and having drainage areas of less than 500 square miles will be accessed. Note that the word AND is used in the logical sense also. This option permits some additional flexibility in making access requests.

3. Optional abbreviation

Abbreviation of the command words and certain operands is possible. The user who is just becoming acquainted with the system should probably use the whole words as given, but a user with more experience may prefer the abbreviated forms.

Abbreviation is possible because the system when reading the command cards reads only enough of each word to identify it uniquely. Thus, to distinguish between the commands ELEMENT and ELEVATION, only the first four letters need be read. Four letters are sufficient to uniquely identify all other commands. The allowable abbreviations are:

a) Command words - the first four letters of the names given in Section I.B;

b) Element names - the first three letters of the names given in Section I.B.2;

c) List operand - the first two letters of the names given in Section I.B.11.

D. OUTPUT FORMATS

This section contains examples of the output that may be produced by the access facilities of HISARS. Examples show the command cards used, and the corresponding output. The examples include all listings that are now available. Other listings will be implemented as the need arises.

1. The output heading page

A heading is printed at the beginning of the output associated with each access group. This contains the system name and version, the date and time of execution, a list of access requests as recognized by the system, and a map showing station locations and location blocks searched. No map is produced if only an Index listing is requested. An example is shown in Figure A 4 , which resulted from the following command cards:

```
ACCESS
ELEMENT      STREAMFLOW
STATION      13196500
LIST         MONTHLY
```

2. Indexes of the files

The command sequence

```
ACCESS
ELEMENT      STREAMFLOW
COUNTY       SHOSHONE  KOOTENAI
LIST         INDEX
```

produced the output shown in Figure A 5 .

Not all of the indexes printed will include information under all headings. An example is drainage area which would not be used for temperature files. For any other spaces left blank, the information was not known at file generation time.

All users are encouraged to obtain indexes of the files of interest to them. This is the only way to determine the file contents, period of record or number of records and so forth.

HISARS

HYDROLOGIC INFORMATION STORAGE AND RETRIEVAL SYSTEM

VERSION OF 03/01/75
RUN ON 10/18/75
AT 12:20:31

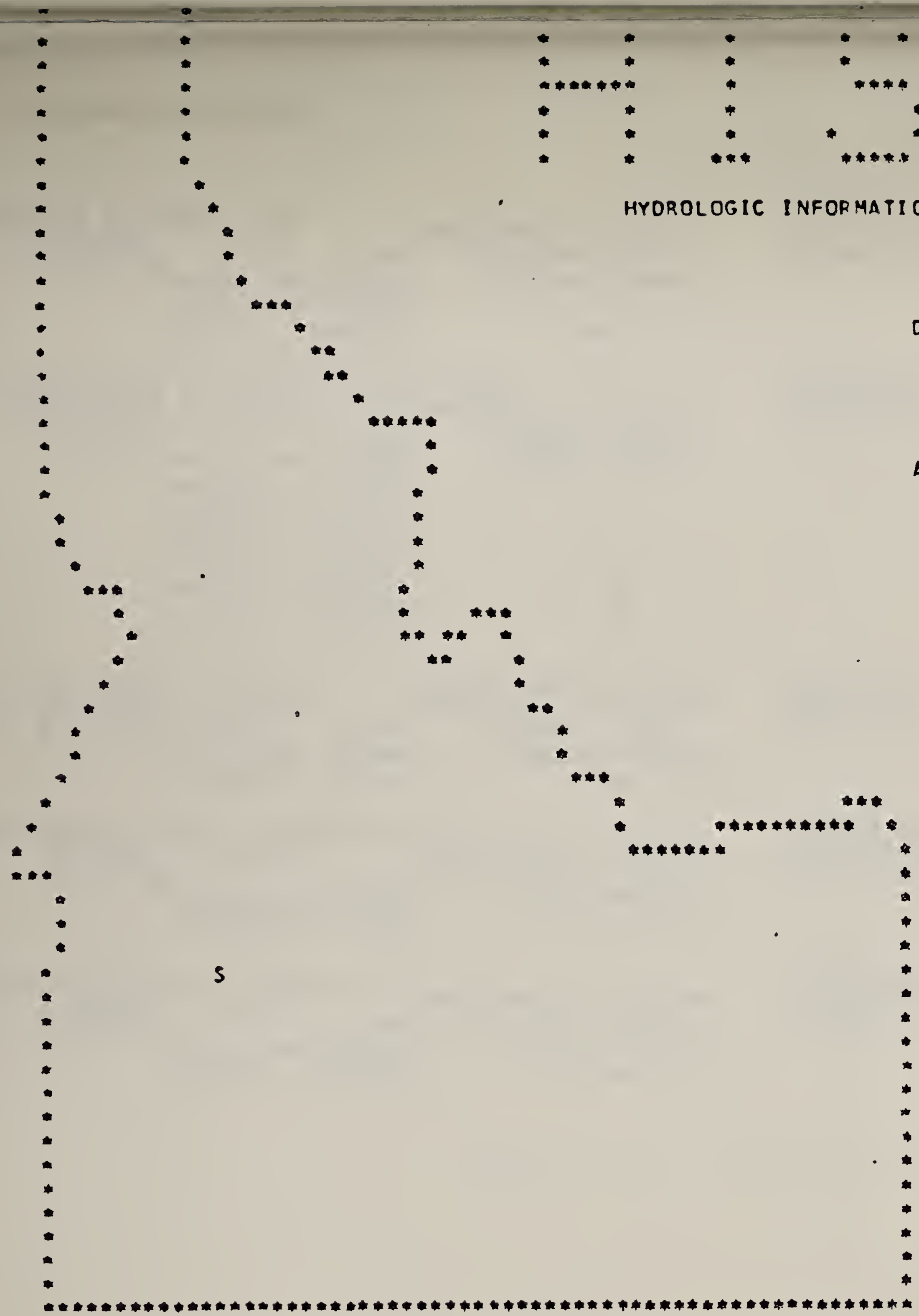
DATA ACCESS REQUESTED FOR:

1 ELEMENT - STREAMFLOW

1 STREAMFLOW STATION - 13.1965.00

ACTION REQUESTED:

LIST MONTHLY RECORDS



W - WEATHER STATIONS

S - STREAMFLOW STATIONS

M - MISCELLANEOUS STATIONS

X - LOCATION BLOCKS

Figure A 4. Output heading page

```
ST. JOE RIVER AT CALDER, IDA                               SHOSHONE                            STATION NO.  12.4145.00
        LATITUDE  47-16-30        LONGITUDE  116-11-15     GEOGRAPHIC LOCATION BLOCK  4716-142-214
        ELEVATION           FT MSL     REGION   04         BASIN  14-/4            AREA     1030 SQ MI
                PERIOD OF RECORDS     LENGTH, MONTHS
                05/1911 - 09/1912            17
                08/1920 - 09/1973           638

COEUR D'ALENE LAKE AT COEUR D'ALENE, IDA                   KOOTENAI                            STATION NO.  12.4155.00
        LATITUDE  47-39-55        LONGITUDE  116-46-05     GEOGRAPHIC LOCATION BLOCK  4716-324-142
        ELEVATION           FT MSL     REGION   01         BASIN  14-/4            AREA     3700 SQ MI
                PERIOD OF RECORDS     LENGTH, MONTHS
                08/1904 - 10/1905            15
                01/1906 - 02/1906             2
                04/1906 - 04/1906             1
                06/1906 - 04/1911            59
                06/1911 - 09/1917            76
                11/1917 - 09/1922            59
                11/1922 - 09/1962           479

HAYDEN CREEK BELOW NORTH FORK NEAR HAYDEN LAKE, IDA        KOOTENAI                            STATION NO.  12.4160.00
        LATITUDE  46-49-22        LONGITUDE  116-39-10     GEOGRAPHIC LOCATION BLOCK  4616-342-412
        ELEVATION  2370     FT MSL     REGION   01         BASIN  14               AREA       22 SQ MI
                PERIOD OF RECORDS     LENGTH, MONTHS
                10/1965 - 09/1973            96

RATHDRUM PRAIRIE CANAL AT HUETTER, IDA                     KOOTENAI                            STATION NO.  12.4180.00
        LATITUDE  47-42-35        LONGITUDE  116-52-05     GEOGRAPHIC LOCATION BLOCK  4716-324-323
        ELEVATION           FT MSL     REGION   01         BASIN  14               AREA          SQ MI
                PERIOD OF RECORDS     LENGTH, MONTHS
                10/1960 - 09/1973           156

SPOKANE RIVER NEAR POST FALLS, IDA                         KOOTENAI                            STATION NO.  12.4190.00
        LATITUDE  47-42-10        LONGITUDE  116-58-40     GEOGRAPHIC LOCATION BLOCK  4716-323-321
        ELEVATION           FT MSL     REGION   01         BASIN  14               AREA     3840 SQ MI
                PERIOD OF RECORDS     LENGTH, MONTHS
                01/1913 - 09/1973           729
```

Figure A 5. Streamflow index listing

3. Monthly streamflow

The command sequence

```
ACCESS
ELEMENT    STREAMFLOW
STATION    13196500
LIST       MONTHLY
```

produced the output shown in Figure A 6

Values listed are monthly streamflow totals. Sufficient decimal places are provided to print the correct total of the daily values. Means are computed for each month, and the numbers of months used in these computations are also listed.

The annual mean discharge is obtained as the sum of the monthly mean values and is not necessarily equal to the mean of the annual totals. For those annual totals which are complete (i.e. contain 12 months of data), the ratio of the total to the annual mean is computed.

If the word PARTIAL follows the operand MONTHLY, the mean annual discharge is not computed until the rest of the table has been printed, so that the ratios of the annual totals to the mean cannot be computed. This processing is more efficient and is recommended unless the ratios are required.

Mean daily discharge values in cubic feet per second and in cubic feet per second per square mile are also given. These values are obtained as the mean for all days used in the computations.

A minus sign to the right of a monthly value indicates that there are missing daily values during the month. Neither the monthly total nor the recorded daily values for such months are used in the computations.

4. Daily streamflow

The command sequence

```
ACCESS
ELEMENT    STREAMFLOW
STATION    12414500
PERIOD     10/1952 to 9/1953
LIST       DAILY 10
```

produced the output shown in Figure A 7 .

Values listed are daily totals in cubic feet per second. Since values are stored in hundredths, they are printed this way, although for larger basins these decimal places are usually not used. Monthly totals are also listed. Note that this is a water year listing so the operand DAILY 10 will begin the listing with October and the entire water year is then on one page. Had the 10 been left off, two pages of output would have resulted.

A dash indicates that the daily value is missing.

BANNOCK CREEK NEAR IDAHO CITY, IDA BOISE STATION NO. 13.1965.00

TOTAL MONTHLY STREAMFLOW IN CFS-DAYS

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL	% AVE
1939		19.55	41.95	96.4	56.38	22.65	9.22	4.94	7.36	11.18	11.5	18.41	299.54	
1940	18.81	24.24	90.5	156.8	87.2	24.88	10.48	4.97	11.09	16.37	20.13	18.84	484.31	61
1941	18.4	20.43	48.2	99	91	45.1	18.36	12.68	11.7	15			379.87	
1950										24.8	33	34.9	92.7	
1951	25.3	52.5	50.9	285.3	293.6	114.4	47.3	31.8	18.5	36.2	30.8	36.1	1022.7	129
1952	27.2	30.5	39.6	429.4	350.6	89.6	34	17.9	15.1	15.5	17.6	23.6	1090.6	138
1953	45.5	46.4	57.7	179	210.3	219.4	49.6	22.8	17.6	18	26.9	25.7	918.9	116
1954	31	38.2	76	233.2	158.4	90.6	51.2	25.7	17.3	16.2	20.4	20.3	778.5	98
1955	22	19.2	25.7	62.9	196.9	58.4	20	9.8	7.9	14.7	21.4	130.1	589	75
1956	111.8	39.6	90.4	347.6	238.6	108.8	40.5	20.8	18.3	29.4	30.2	31.5	1107.5	140
1957	25.6	42	104.1	281.9	500.2	122	35.4	17.6	14.5	25.7	25.9	33.5	1228.4	155
1958	27.4	53.7	73.9	311.7	517	108.3	44.7	18.6	17.6	19.9	25.5	28.1	1246.4	158
1959	31.6	30	43.7	126.2	128.1	64.3	21.9	13.4	22.7	28.7	23.2	24.3	558.1	71
1960	23.4	19.7	53.2	206.6	146.8	58.4	16.8	11.2	12.3	14.8	20.6	18.7	602.5	76
1961	15.5	24.3	40.5	70.9	65.7	28.6	10.7	7.2	11.2	14.5	18.6	21.4	329.1	42
1962	17	19.5	21.7	169.9	169.5	81.6	25.5	12	12.2	21	22.6	26.2	598.7	76
1963	16.9	52.8	50.1	124.8	174.9	92.8	25.8	10.5	10.2	14.5	20.8	17.3	611.4	77
1964	18.8	17.1	19.3	81	173.2	72	21.9	8.9	9.8	11.3	16.6	96.6	546.5	69
1965	70.3	89.9	103.3	531.6	377	123.6	40.8	20.6	22.5	24.9	25.5	24.1	1454.1	184
1966	31.5	28.6	52.7	107.7	66.8	26.2	11.1	6.2	8.1	11.3	15.5	19.24	384.94	49
1967	25.41	21.8	39.3	75.6	156.7	58.1	18.55	6.32	8.35	14	15.72	17.15	457	58
1968	19.3	42.95	58.3	72.8	62.2	41.69	12.19	19.52	15.73	17.45	29.04	21.07	412.24	52
1969	50.76	37.5	68.5	488	279	70.5	32.7	14.84	16.19	20.67	23.96	25.66	1128.28	143
1970	61.55	60.6	114.1	132.2	349.9	113.9	46.13	14.74	17.84	24.49	43.11	44.68	1023.24	129
1971	80.3	92.7	136.8	497	511.1	120.3	50.06	18.46	17.69	27.72	1.84-		1553.97	
MEAN	35.44	38.49	62.51	215.31	223.37	81.50	28.95	14.64	14.23	19.53	23.41	32.93		
NO. OF MONTHS	23	24	24	24	24	24	24	24	24	25	23	23		
PERCENT ANNUAL	4.5	4.9	7.9	27.2	28.3	10.3	3.7	1.9	1.8	2.5	3.0	4.2		

MEAN ANNUAL DISCHARGE 790.37 CFS-DAYS
MEAN DAILY DISCHARGE 2.17 CFS
0.38 CFS/SQ MI (5.75 SQ MI)

Figure A 6. Streamflow file monthly data listing

ST. JOE RIVER AT CALDER, IDA SHOSHONE 12.4145.00

MEAN DAILY STREAMFLOW IN CFS

1952-53	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
1	342.00	333.00	230.00	290.00	5270.00	890.00	2040.00	6500.00	8660.00	2830.00	728.00	494.00
2	338.00	309.00	302.00	265.00	3940.00	798.00	1900.00	5460.00	10200.00	2720.00	702.00	515.00
3	333.00	290.00	346.00	294.00	3370.00	798.00	1870.00	4850.00	8960.00	2660.00	709.00	531.00
4	333.00	279.00	342.00	358.00	4210.00	798.00	1790.00	4890.00	7880.00	2590.00	819.00	499.00
5	329.00	290.00	317.00	290.00	3300.00	770.00	1920.00	5940.00	7750.00	2470.00	722.00	484.00
6	325.00	294.00	298.00	260.00	2670.00	735.00	2050.00	8200.00	7590.00	2360.00	670.00	474.00
7	325.00	283.00	294.00	280.00	2470.00	716.00	1960.00	11000.00	7680.00	2250.00	634.00	459.00
8	321.00	257.00	302.00	294.00	2550.00	763.00	1780.00	9440.00	7500.00	2160.00	670.00	449.00
9	313.00	221.00	279.00	728.00	2250.00	928.00	1580.00	7570.00	6900.00	2100.00	702.00	435.00
10	313.00	224.00	279.00	1170.00	1960.00	1210.00	1490.00	6160.00	6460.00	1970.00	658.00	435.00
11	313.00	325.00	275.00	1090.00	1790.00	1390.00	1480.00	5310.00	6860.00	1850.00	599.00	430.00
12	304.00	367.00	321.00	2770.00	1590.00	1430.00	1480.00	5030.00	7880.00	1770.00	559.00	426.00
13	307.00	371.00	440.00	3290.00	1490.00	1340.00	1420.00	5180.00	8680.00	1680.00	537.00	411.00
14	306.00	346.00	384.00	2010.00	1380.00	1240.00	1320.00	5730.00	7500.00	1600.00	499.00	393.00
15	306.00	350.00	321.00	1340.00	1340.00	1210.00	1220.00	6630.00	6560.00	1530.00	499.00	389.00
16	309.00	338.00	283.00	1130.00	1240.00	1240.00	1310.00	7570.00	5940.00	1440.00	499.00	376.00
17	306.00	307.00	268.00	1230.00	1200.00	1310.00	1500.00	8800.00	5800.00	1340.00	499.00	367.00
18	302.00	290.00	272.00	1800.00	1130.00	1200.00	1840.00	9410.00	5560.00	1270.00	504.00	371.00
19	302.00	283.00	275.00	2610.00	990.00	1250.00	2100.00	10900.00	5090.00	1210.00	515.00	362.00
20	302.00	283.00	272.00	2320.00	860.00	1270.00	2920.00	10900.00	4600.00	1160.00	521.00	371.00
21	302.00	268.00	261.00	2340.00	930.00	1230.00	4570.00	8710.00	4160.00	1120.00	531.00	367.00
22	298.00	208.00	261.00	1810.00	912.00	1170.00	6200.00	7130.00	3880.00	1060.00	526.00	362.00
23	298.00	150.00	257.00	1890.00	868.00	1130.00	9650.00	6140.00	3740.00	1010.00	521.00	371.00
24	298.00	208.00	217.00	2250.00	784.00	1170.00	10600.00	6260.00	3530.00	982.00	622.00	402.00
25	294.00	230.00	160.00	1930.00	819.00	1720.00	9180.00	6220.00	3350.00	958.00	749.00	411.00
26	294.00	140.00	210.00	1670.00	812.00	1910.00	8860.00	6580.00	3180.00	950.00	599.00	430.00
27	294.00	100.00	260.00	1400.00	833.00	1840.00	10500.00	7500.00	3080.00	898.00	576.00	531.00
28	290.00	120.00	280.00	1250.00	935.00	1920.00	12900.00	7680.00	2990.00	861.00	570.00	531.00
29	287.00	130.00	298.00	1180.00		2020.00	10500.00	7900.00	2960.00	826.00	570.00	521.00
30	313.00	180.00	317.00	1500.00		2170.00	8070.00	8390.00	2880.00	798.00	542.00	407.00
31	354.00		317.00	2110.00		2210.00		8110.00		763.00	510.00	
TOTAL	9658.00	7776.00	8938.00	43169.00	51893.00	39776.00	126000.00	226090.00	177800.00	49186.00	18561.00	13004.00

Figure A 7. Streamflow file daily data listing

5. Monthly listings from rainfall file

The command sequence

```
ACCESS
ELEMENT    RAINFALL
STATION    101956
PERIOD     1/1950 To 12/1972
LIST       MONTHLY
```

produced the output shown in Figure A 8 . The addition of the work PARTIAL would delete the last column.

Values in the table are totaly monthly precipitation amounts in inches. The following special symbols are used to qualify the monthly amounts:

- \- missing values during month;
- * accumulations during month;
- E estimated values during month.

Only one symbol is printed for one month, and the symbol is selected in the above order. Thus, if a minus sign appears, there may also be accumulations or estimated values during the month, but if an E is printed, there are neither missing values nor accumulations.

Monthly means are computed excluding those months marked with a minus sign, and the mean annual precipitation is obtained as the sum of the monthly means. Annual totals are obtained for all years, but the ratio of the annual total to the annual mean is obtained only for years with no missing values.

** CAUTION **

Much rainfall data previous to 1970 is <u>not</u> flagged for missing, accumulated or estimated data . Therefore, the above symbols may not appear in the listings for dates before 1970.

6. Daily listings from rainfall file

The command sequence

```
ACCESS
ELEMENT    RAINFALL
STATION    107301
PERIOD     1/1970 to 12/1970
LIST       DAILY
```

produced the output shown in Figure A 9 .

Values in the table are daily precipitation amounts in inches. Amounts are qualified by the following special symbols:

- -- amount missing;
- * amount accumulated;
- E amount estimated;
- T trace reported;
- X invalid code combination.

Combinations of the symbols may be printed as appropriate.

Monthly totals are also printed.

COEUR D'ALENE 1 E KOOTENAI STATION NO. 10-1956

TOTAL MONTHLY PRECIPITATION IN INCHES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL	% AVE
1950	4.69-	2.82	4.40	1.06	1.04	2.98	1.14	0.95	0.38	4.48	2.25	2.63	28.82	
1951	4.38	2.07	2.86	0.44	1.28	1.88	0.86	0.68	0.71	6.96	2.49	6.39	31.00	126
1952	3.67	1.54	1.28	0.88	0.88	2.25	0.32	0.10	0.52	0.35	0.68	4.00	16.47	67
1953	5.32	1.91	1.91	2.12	2.29	1.66	0.00	1.22	0.38	0.52	3.73	3.13	24.19	99
1954	6.82	1.61	0.86	1.20	1.36	1.58	1.30	2.83	1.30	1.43	2.45	2.80	25.54	104
1955	1.50	2.16	0.94	2.54	1.33	1.82	1.86	0.00	1.54	4.12	5.03	5.25	28.09	115
1956	4.51	2.11	2.44	0.47	2.83	2.60	1.16	1.81	0.69-	2.34-	0.95	2.72	24.63	
1957	2.09	2.83	2.61	1.48	6.43	2.63	0.09	0.49	0.86	3.22	1.64	3.08	27.45	112
1958	4.15	3.63	1.33	3.94	0.63	2.13	1.13	0.25	0.71	2.11	4.19-	4.02-	28.22	
1959	5.45	1.84-	2.03	1.65	2.06	0.79	0.11	0.65	2.81	2.53	2.19-	1.65	23.76	
1960	1.57-	2.22	1.01-	1.40-	3.50-	0.82	0.00	2.17	1.13	1.48-	3.42-	0.38-	19.10	
1961	1.18-	3.38-	2.38-	1.39-	2.22	1.05	0.36	0.62	0.35	1.53	2.07E	2.73-	19.26	
1962	0.53-	1.13-	1.87-	0.13-	1.74-	0.73	0.28	1.03	1.04	1.42-	2.88-	1.10-	13.88	
1963	0.55	2.03-	1.39	1.02-	1.67	1.66	1.03	0.63	1.36	1.45	3.94-	2.16-	18.89	
1964	4.25E	0.51-	2.00-	1.19	0.58	4.01	1.49	2.63	1.65	1.05	2.91	7.85E	30.12	
1965	3.59-	1.78-	0.15	3.02	1.27	2.36	0.22	3.54	1.04	0.26	2.13-	1.79	21.15	
1966	4.07	0.92	2.51-	0.35	0.63	1.47	0.55	0.59	0.21	0.82	4.60-	2.76-	19.48	
1967	4.36-	1.05	1.82-	2.34	2.18	2.03	0.04	0.00	0.70	3.26	1.89	2.74	22.41	
1968	2.81	4.16	0.95	0.48	2.41	2.01	0.35	2.32	2.29	3.49	3.26-	3.64-	28.17	
1969	0.00-	1.15-	0.74	2.56-	0.00-	2.30	0.32	0.00	1.35	1.37	0.54	2.21-	12.54	
1970	3.68-	3.27	0.65-	1.94-	0.47	1.87	1.10	0.32	0.89	2.28-	3.18-	2.91-	22.56	
1971	4.01*	1.77	2.98*	1.99*	2.11	4.62	0.88	1.90	2.05	1.82	2.64*	4.95*	31.72	129
1972	4.37*	2.12-	2.79*	2.32*	2.33	1.61	0.67	1.64	1.21	0.83	1.72	3.35-	24.96	
MEAN	3.86	2.27	1.85	1.62	1.80	2.04	0.66	1.15	1.11	2.19	2.21	3.77		
NO. OF MONTHS	15	15	16	17	20	23	23	23	22	19	14	13		
PERCENT ANNUAL	15.8	9.3	7.6	6.7	7.4	8.4	2.7	4.7	4.6	9.0	9.1	15.4		

MEAN ANNUAL PRECIPITATION 24.53 INCHES

Figure A 8. Precipitation file monthly data listing

POTLATCH 3 NNE LATAH 10-7301

DAILY PRECIPITATION IN INCHES

1970	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1			0.40	0.11					0.03			0.05
2			0.18	0.25				0.02				
3	0.03								0.15			0.15
4									0.56			
5									0.01	0.20	0.22	0.06
6		0.21	0.19		0.35					0.02	0.01	
7			0.27	0.11	0.02							
8					0.08	0.25					0.10	
9	0.47			0.20	0.41	0.29				0.92	0.07	0.11
10	0.28			0.01		0.01						
11			0.15								0.42	
12	0.28		0.10		0.14					0.04	0.31	
13	0.97	0.71			0.02	0.10	0.73					
14	0.28		0.25			0.28						0.04
15		0.60	0.03			0.56						0.15
16	0.27	0.41	0.40								0.59	0.10
17	0.08	0.28										
18	0.93								0.27	0.01	0.27	
19	0.61			0.42								
20	0.33			0.17					0.07	0.22	0.09	
21	0.43						0.05			0.09		0.04
22	0.30			0.03					0.26			
23	0.74									0.38	0.17	0.20
24	0.73			0.46						0.07	0.47	
25	0.41			0.02			0.11				0.13	
26	0.22										0.11	
27	0.32			0.02		0.46	1.15				0.05	
28	0.02		0.53				0.25					0.06
29			0.11	0.03	0.13	0.01						0.26
30				0.04	0.16						0.32	0.16
31	0.19							0.01				
TOTAL	7.89	2.21	2.61	1.87	1.31	1.96	2.29	0.03	1.35	1.95	3.33	1.38

Figure A 9. Precipitation file daily data listing

7. Monthly average, maximum and minimum temperatures

The command sequence

```
ACCESS
ELEMENT    TEMPERATURE
STATION    101551
LIST       MONTHLY
```

produced the output shown in Figure A 10. The addition of the word PARTIAL would delete the last column.

Values in the table are the average maximum and minimum temperatures in degrees Fahrenheit for each month. If there are missing daily maximum temperatures during a month, a minus sign is printed to the right of the average maximum. Similarly, missing daily minimum temperatures are identified by a minus sign to the right of the average minimum. If there are any estimated values of either maximum or minimum daily temperatures, an E is printed to the right of the average maximum, provided that there are not also missing maximum temperatures.

Monthly means are calculated using only values for complete months. The number of months printed is the number of months with complete minimum temperatures.

The mean annual temperatures are computed as the average of all complete months. These values may be biased if certain months are missing.

The annual average temperatures are computed using all the monthly averages, and are therefore subject to the same source of unreliability cited above. However, the ratio of the annual average to the mean annual temperature is calculated only for years with complete data.

8. Daily maximum and minimum temperatures

The command sequence

```
ACCESS
ELEMENT    TEMPERATURE
STATION    100010
PERIOD     1/1951 To 12/1951
LIST       DAILY
```

produced the output shown in Figure A 11.

Values in the table are daily maximum and minimum temperatures in degrees Fahrenheit. Missing values are left blank.

Monthly averages are also printed. For months with missing days, the averages are calculated using the available data.

** NOTE ** These same command sequences are used to obtain the water temperatures of the evaporation pans <u>BUT</u> the DD cards <u>must be</u> modified as shown in Section 1.5.

CASTLEFORD 2 N | TWIN FALLS | STATION NO. 10-1551

AVERAGE MONTHLY MAXIMUM AND MINIMUM TEMPERATURES IN DEGREES F.

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL	% AVE
1963						74.2	88.6	88.6	81.0	71.3	48.8	36.3	69.9	
						44.0	49.9	51.5	48.9	38.7	28.6	17.9	39.9	
1964	35.8	37.4	45.1	58.6	71.4	75.3	90.0	85.3	75.2M	68.7	47.8	41.1	61.1	
	15.9	17.5	22.7	30.2	38.3	44.6	52.0	48.5	38.0M	33.5	25.0	23.1	32.5	
1965	40.2	48.5	53.5	62.9	70.0M	78.5	86.1				54.6	40.5M	59.5	
	23.9	23.8	19.3M	37.0	37.2M	46.8	49.8				29.9	18.4M	31.8	
1966	41.2M	42.6M	55.2M	64.6M	79.3M	79.6	89.9	87.4M	81.8	67.1M	53.2M	37.1M	65.0	
	21.8M	20.0M	24.8M	30.3M	41.2M	47.0M	50.1	50.4M	42.6M	30.5M	29.9M	20.4M	34.2	
1967	42.9M	50.3M	55.4M	55.6	71.9	77.7	91.8M	92.1	82.6	65.5	52.6	36.6	64.7	
	26.2M	24.6M	27.2M	29.6	38.2M	46.2	55.4M	53.3	46.7	34.1M	29.5	17.0	35.7	
1968	39.0M	48.5M	59.0	59.5	73.6M	82.2	91.6	80.0	76.4	64.8	47.1	39.2	63.5	
	16.1M	26.6M	28.1M	29.0	38.8M	48.2	51.9	49.1	41.6	31.9	29.2	20.7	34.3	
1969	40.3	40.0	51.3	67.0	76.0	77.2	88.9	90.8	81.5	58.3	51.5	40.6	63.7	99
	21.5	22.7	24.5	32.8	42.3	47.4	53.1	51.0	43.9	30.0	23.4	23.9	34.8	99
1970	40.8	51.9	52.5	56.1	71.5	81.7	88.5	90.7	74.1	61.6	49.0	38.1	63.1	98
	25.9	26.6	26.8	28.3	38.7	47.1	53.4	53.2	38.8	30.3	30.4	18.9	34.9	99
1971	40.8	47.4	50.5	61.4M	72.7	80.0M	89.0	91.1	74.8	60.5	M	33.7	63.9	
	22.5	24.5	26.1	32.9M	41.2	47.8M	52.5	55.1	38.7	32.9	40.7	17.2	36.1	
1972	35.0	43.0	58.5	60.8	73.8	81.7	87.6	87.4	70.7	61.3	46.8	32.1	61.6	96
	18.2	23.9	30.6	31.5	38.8	48.6	50.8	51.9M	41.0	35.3	27.1	13.1	34.3	
1973	35.2	43.8	52.3	60.7	74.7	82.0	88.5	87.6	74.7	65.0	47.6	42.8M	63.0	
	16.7	23.2	26.3M	31.8	38.5	44.6	52.5	53.5M	43.6	33.8	29.2	27.8M	35.2	
MEANS	38.3	44.5	52.8	60.2	73.1	79.0	88.9	88.2	77.5	64.1	49.5	37.2		
	20.7	23.1	26.1	31.3	39.6	46.4	51.6	51.7	42.9	33.3	29.3	19.0		
NO. OF MONTHS	7	7	5	8	6	9	10	7	8	8	9	8		

MEAN ANNUAL MAXIMUM TEMPERATURE 64.3 DEGREES F.
MEAN ANNUAL MINIMUM TEMPERATURE 35.3 DEGREES F.

Figure A 10. Air temperature file monthly data listing

ABERDEEN EXP STATION BINGHAM 10-0010

DAILY MAXIMUM AND MINIMUM TEMPERATURES IN DEGREES F.

1951	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
1	31	10	13	-12	32	8	51	28	49	31	58	36	88	47	91	61	78	38	73	40	38	15	46	26
2	30	24	23	6	34	18	60	25	57	30	57	33	84	49	88	61	78	39	64	44	42	7	43	27
3	37	26	37	21	32	15	64	25	68	28	63	32	94	44	82	61	78	40	59	40	48	16	30	26
4	33	17	39	22	39	22	63	29	77	42	74	33	88	55	78	61	80	40	53	39	55	22	34	20
5	30	16	40	34	38	20	65	26	80	34	63	46	91	44	81	53	83	44	59	38	50	17	36	24
6	23	7	40	32	40	13	65	27	78	47	63	34	89	42	85	52	84	48	64	29	51	13	27	16
7	20	-3	51	34	38	31	68	29	69	46	60	32	82	39	83	47	88	41	67	30	54	18	23	10
8	24	-1	47	34	38	22	64	31	57	40	67	31	83	40	80	45	82	54	73	32	55	33	13	-6
9	25	14	55	31	45	27	67	42	68	36	72	35	82	44	83	44	76	36	78	30	60	18	12	-13
10	29	10	55	31	31	11	60	31	73	35	76	37	79	50	87	45	85	37	79	33	57	24	19	0
11	33	14	57	33	32	7	58	18	72	38	80	39	72	43	93	49	77	44	69	42	54	32	23	16
12	29	2	46	30	37	16	68	22	55	31	69	54	82	41	85	49	65	29	58	38	43	32	25	19
13	31	19	38	20	37	26	74	28	55	38	75	46	97	46	83	49	75	32	58	36	40	25	24	20
14	42	25	39	18	47	29	72	32	63	27	81	44	97	50	80	44	81	34	66	31	40	30	23	-4
15	32	22	48	22	50	31	58	23	75	31	89	50	99	45	90	39	79	43	58	40	36	20	30	4
16	33	20	46	25	49	23	69	23	73	37	86	48	98	58	92	48	86	37	52	19	31	9	35	26
17	41	24	43	17	34	19	72	38	77	38	84	47	98	59	93	49	83	39	55	24	34	8	35	24
18	43	26	41	28	40	16	68	40	75	48	80	46	99	55	90	48	78	47	55	20	39	9	32	20
19	27	18	35	20	48	23	65	48	74	43	80	41	94	63	90	61	82	38	61	35	43	17	35	14
20	23	1	38	21	56	24	62	23	73	44	77	43	86	62	85	58	80	54	57	36	48	23	22	3
21	33	12	39	26	63	28	58	30	75	44	76	40	83	54	84	50	61	29	47	29	44	30	29	16
22	39	30	49	25	52	31	64	20	80	41	73	41	87	44	81	55	68	36	49	28	38	19	35	22
23	39	19	48	25	48	20	63	32	80	47	75	37	97	48	79	53	71	41	59	36	37	19	29	4
24	40	24	44	23	55	21	59	36	73	47	75	54	95	56	74	52	77	43	52	37	35	17	22	17
25	38	17	39	24	58	24	65	25	72	45	74	44	95	54	77	37	74	48	53	34	42	20	19	-5
26	42	15	38	9	55	35	63	43	82	45	82	40	95	58	83	40	68	44	55	25	43	24	25	1
27	39	30	31	21	50	28	67	36	87	54	81	41	85	58	81	44	78	27	55	24	45	27	38	23
28	30	-2	31	15	46	17	62	48	81	50	81	40	86	59	82	48	79	36	57	20	49	29	37	26
29	11	-12			54	20	49	33	75	35	79	45	82	58	72	47	75	46	60	27	54	25	37	29
30	11	-8			47	31	45	31	71	42	83	42	86	53	70	44	78	56	53	17	54	32	35	20
31	10	-8			41	30			63	39			94	53	74	41			43	18			20	10
AVEMAX	30.6		41.1		44.1		62.9		71.2		74.4		89.3		83.1		77.6		59.4		45.3		28.8	
AVEMIN	13.2		22.7		22.2		30.7		39.8		41.0		50.7		49.5		40.7		31.3		21.0		14.0	

Figure A 11.. Air temperature file daily data listing

9. Monthly listings from the pan evaporation file

The command sequence

```
ACCESS
ELEMENT        EVAPORATION
STATION        100010
PERIOD         1/1958 To 1972
LIST           MONTHLY
```

produced the output shown in Figure A 12. The addition of the word PARTIAL would delete the last column.

Values in the table are total monthly evaporation amounts in inches and total monthly wind movement in miles. The following special symbols are used to qualify values of both evaporation and wind movement:

- \- missing values during month;
- * accumulations during month;
- E estimated values during month.

Only one symbol is printed for one month, and the symbol is selected in the above order.

Monthly means are computed excluding those months marked with a minus sign, and the mean annual values are obtained as the sum of the monthly means. The number of months printed is the number of months with complete evaporation data. Annual totals are obtained for all years, but the ratio of the annual total to the annual mean is obtained only for years with no missing values.

10. Daily listings from the pan evaporation file

The command sequence

```
ACCESS
ELEMENT        EVAPORATION
STATION        100010
PERIOD         1/1958 To 12/1958
LIST           DAILY
```

produced the output shown in Figure A 13.

Values in the table are daily evaporation amounts in inches and total daily wind movement in miles. Missing values are left blank. Amounts are qualified by the following special symbols:

- * amount accumulated
- E amount estimated

Only one symbol is printed for one month, and the symbol is selected in the above order.

Monthly totals are also printed.

ABERDEEN EXP STATION

TOTAL MONTHLY EVAPORATION IN INCHES AND WIND MOVEMENT IN MILES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL	% AVE
1958	0.00-	0.00-	0.00-	0.00-	6.97-	8.27-	9.88	8.97-	6.27-	4.40-	0.00-	0.00-	44.76	
	1901-	2333-	2364-	3149	2202	2208	1778	1833	2209	1812	2383	2043	26235	
1959	0.00-	0.00-	0.00-	0.00-	6.64-	8.23-	9.58-	10.65-	5.54-	4.20-	0.00-	0.00-	44.84	
	2113	2794	3965	3927	3412	1713	1751	2155	2320	2649	2903	1570	31272	103
1960	0.00-	0.00-	0.00-	0.00-	8.53	10.62	10.91	9.94	7.08	4.22			51.30	
	1555	2438	2791	3584	3288	2618	1419-	2107	1332	1897			23029	
1961					7.91-	9.66	10.80	8.25	5.00-	3.24-			44.86	
					2934-	1669	1604	1304	1939	2402			11852	
1962								5.72-	6.64	3.77			16.13	
								1448-	2015	2919			6382	
1963					5.66-	6.07-	10.74	7.91	4.52	3.38-			38.28	
					2360	2024	1982	1583	1443	2075			11467	
1964					7.28-	6.65-	10.31	10.24	6.76	4.36-			45.60	
					3113-	2694-	2459	2767	2453	2024			15510	
1965					6.43-	8.47-	9.73-	8.06-	5.62-	4.74			43.05	
					3592-	3109	2138-	2151	3435	2362			16787	
1966					9.57-	10.03	11.89	10.23	6.05-	2.75-			50.52	
					3731-	3196	2259	2353	2421-	2579			16539	
1967					7.59-	7.06-	10.73	10.65	6.77	4.15-			46.95	
					3203-	1989	2193	2098	1925	2597			14005	
1968					7.25-	9.34	11.22	7.37	5.88	4.04			45.10	
					3267-	2779	2112	2344	2340	2502			15344	
1969					9.95-	8.28	11.44	11.41	8.28	3.22-			52.58	
					2861-	2879	2516	2340	2347	2990			15933	
1970					7.37-	8.72	8.60-	10.40	6.53	3.79-			45.41	
					2982	2458	2157-	1826	2281	2085-			13789	
1971					6.58-	9.11-		9.43	7.30	3.25-			35.67	
					3625	2866		2153	3131	3110			14885	
1972					7.48-	8.71	11.20	9.06-	6.56-	4.37-			47.38	
					3140	2773	2977	2243	2976	2546			16655	
1973					7.83-								7.83	
					3538								3538	
MEANS	0.00	0.00	0.00	0.00	8.53	9.34	10.91	9.58	6.64	4.19	0.00	0.00		
	1834	2616	3378	3553	3068	2483	2165	2090	2296	2462	2643	1807		
NO. OF MONTHS	0	0	0	0	1	7	10	10	9	4	0	0		
PERCENT ANNUAL	0.0	0.0	0.0	0.0	17.4	19.0	22.2	19.5	13.5	8.6	0.0	0.0		
	6.1	8.7	11.2	11.7	10.1	8.2	7.2	6.9	7.6	8.1	8.7	6.0		

MEAN ANNUAL EVAPORATION 49.19 INCHES
MEAN ANNUAL WIND MOVEMENT 30395 MILES

Figure A 12. Pan evaporation file monthly data listing

DAILY EVAPORATION IN INCHES AND WIND MOVEMENT IN MILES

1958	JANUARY	FEBRUARY	MARCH	APRIL	MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER	DECEMBER
1	82		56	42		91	0.13	23	0.24	32	0.29	45		55	0.13	51	13	16
2	42		126	93	0.30	88	0.18	37	0.18	39		29	0.49	158	0.20	37	22	98
3	6	45	33	85	0.31	86	0.22	87	0.12	80	0.18	54	0.31	68	0.06	23	76	139
4	23	27	53	211	0.54	135	0.24	88	0.27	37	0.40	61	0.37	56	0.14	13	230	195
5	22	105	139	142	0.16	44	0.21	40	0.31	50	0.41	88	0.33	55	0.11	17	126	141
6	24	148	90	32	0.32	101	0.26	73	0.34	20	0.43	80	0.25	21	0.24	97	133	204
7	41	39	61	33	0.23	100		108	0.32	4	0.22	40	0.30	19	0.36	211	217	100
8	37	22	88	90	0.20	70	0.45	97	0.36	96	0.40	40	0.13	15	0.28	240	164	191
9	48	56	131	155		110	0.27	153	0.35	49		108	0.18	35	0.17	140	106	26
10	39	130	30	66	0.27	55	0.23	53	0.39	49	0.27	28	0.28	82	0.19	115	112	9
11	148	95	73	24	0.26	104	0.22	26	0.38	52	0.20	12	0.23	54	0.11	31	38	35
12	37	62	100	17	0.08	203	0.21	63	0.49	66	0.28	26	0.08	35	0.15	21	7	77
13	48	217	94	41	0.19	83	0.19	42	0.81	266	0.54	61	0.26	233	0.14	32	100	22
14	69	152	51	108	0.16	24	0.19	106	0.28	76	0.33	54	0.27	99	0.17	7	172	22
15	25	107	67	111	0.15	20	0.38	77	0.28	20	0.40	43	0.17	97	0.22	43	92	25
16	26	135	84	129	0.29	64	0.21	14	0.30	49		46	0.25	29	0.19	77	111	20
17	44	59	41	77	0.30	80	0.41	70	0.36	49	0.51	98	0.20	52	0.08	5	60	17
18	71	21	105	253	0.29	40	0.25	84	0.34	91	0.37	89	0.19	105	0.17	73	40	13
19	25	32	43	145		30		54	0.38	69	0.37	72	0.28	97	0.14	106	50	34
20	35	22	64	245	0.25	35	0.34	49	0.38	80	0.22	37	0.29	158	0.10	186	52	8
21	91	33	153	187	0.36	67	0.35	29	0.39	79	0.28	7		42		42	18	10
22	68	24	58	209	0.30	32	0.44	70	0.26	15	0.26	36	0.12	30	0.08	22	35	31
23	17	72	51	72	0.23	61	0.21	10	0.20	15	0.14	18	0.14	162	0.13	20	98	10
24	189	77	55	66	0.22	38	0.47	191	0.21	56		16	0.10	117	0.09	48	121	15
25	73	238	117	96	0.29	54	0.35	83	0.35	33	0.37	62	0.21	126	0.12	61	78	64
26	36	221		80	0.23	45		26	0.41	103	0.38	68	0.19	46	0.14	17	15	59
27	85	131	52	189		77	0.54	76	0.18	22	0.37	67	0.13	13	0.18	20	38	82
28	161	63	57	76	0.24	66	0.48	168	0.29	20	0.46	136	0.20	54	0.10	10	25	76
29	85		93	54	0.41	71	0.44	79	0.36	97	0.39	142	0.17	53	0.11	7	22	19
30	204		101	21	0.29	69	0.40	132	0.18	32	0.25	68	0.15	43	0.04	23	12	32
31			98		0.10	59			0.17	52	0.17	102			0.06	17		253
TOTAL	0.00	0.00	0.00	0.00	6.97		8.27		9.88		8.97		6.27		4.40		0.00	0.00
TOTAL	1901	2333	2364	3149		2202		2208		1798		1833		2209		1812	2383	2043

Figure A 13. Pan evaporation file daily data listing

11. Monthly listings from the snowfall file

The command sequence

```
ACCESS
ELEMENT    SNOWFALL
STATION    101956
LIST       MONTHLY
```

produced the output shown in Figure A 14. The addition of the word PARTIAL would delete the last column. Note that the listing begins with July without the use of an additional operand for the LIST command.

Values in the table are total monthly snowfall amount in inches. The following special symbols are used to qualify the monthly amounts:

- \- missing values during month;
- * accumulations during month;
- E estimated values during month;
- T Trace total for month.

Only one symbol is printed for one month, and the symbol is selected in the above order.

Months during the period of record which are blank are assumed to have no snowfall. Monthly means are computed including these months, but excluding months marked with a minus sign. The mean annual snowfall is obtained as the sum of the monthly means. Annual totals are obtained for all years, but the ratio of the annual total to the annual mean is obtained only for years with no missing values.

** CAUTION **

Much snowfall data previous to 1970 is not flagged as given above. Therefore, the listings will seldom show the above symbols for data previous to 1970.

12. Daily listings from the snowfall file

The command sequence

```
ACCESS
ELEMENT    SNOWFALL
STATION    101956
PERIOD     7/1971 To 6/1972
LIST       DAILY
```

produced the output shown in Figure A 15.

Values in the table are daily snowfall amounts in inches, and snow depth on ground at time of observation in inches. Values are qualified by the following special symbols:

- M amount or depth missing;
- * amount accumulated
- E amount or depth estimated
- T trace amount or depth

Combinations of the symbols may be printed as appropriate.

Monthly total snowfall amounts are also printed.

COEUR D'ALENE 1 E KOOTENAI STATION NO. 10-1956

TOTAL MONTHLY SNOWFALL IN INCHES

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	ANNUAL	% AVE
40-41					10.0	1.1	9.3	2.0					22.4	44
41-42					0.5	10.1	4.8	13.5	0.5				29.4	57
42-43					11.4	23.4	26.1	13.6	1.5				76.0	148
43-44							1.8	15.7	1.0				18.5	36
44-45					1.0	10.8	1.4	0.0	0.0-				13.2	
45-46					8.0	8.4	12.7	13.3					42.4	83
46-47					12.5	7.5-	19.0	1.0	1.0				41.0	
47-48					3.3	5.5-	2.1-	8.6	2.5				22.0	
48-49					1.3	31.3	9.9	28.5	5.5				76.5	149
49-50						23.6	56.9-	8.5	5.6		2.0		96.6	
50-51					3.3	9.1	19.7	8.0	21.5				61.6	120
51-52				0.3	6.0	29.4	35.3	10.8	5.5	0.0-			87.3	
52-53						15.0	10.5	2.8	0.5				28.8	56
53-54						3.4	56.2	4.0					63.6	124
54-55						10.0-	13.0	39.5	3.5	0.0-			66.0	
55-56					12.7-	20.8	21.1-	24.8-	7.5				86.9	
56-57					2.4	4.7	33.8	17.6	6.8				65.3	128
57-58				6.8	2.5	11.5	1.5	1.0	0.0-				23.3	
58-59					3.5	7.0	19.0	16.0					45.5	89
59-60					11.3	2.0	13.5	5.5	3.0-				35.3	
60-61					4.0	5.5	10.5	0.0-	5.5				25.5	
61-62					16.3	24.8	23.1	1.0	12.0-				77.2	
62-63						1.0	2.5	13.5	0.8				17.8	35
63-64						22.0	27.0	3.8	5.0	2.5			60.3	118
64-65					12.0	43.0	19.3	4.6					78.9	154
65-66					1.0	16.8	21.4	4.5	7.4				51.1	100
66-67					1.0	8.0	9.1-	3.6	7.8				29.5	
67-68					2.0	15.1	17.9	3.0					38.0	74
68-69					2.3	15.5-	0.0-	6.0	0.5	0.0-	0.0-		24.3	
69-70						10.0	82.0	0.0	9.0	2.0			103.0	201
70-71					7.0	20.0	19.5	6.5	0.5-	0.0-			53.5	
71-72				3.0	5.0	33.5*	30.0*	2.0-	4.0				77.5	
72-73				T	T	7.4	7.8	5.0					20.2	39
MEAN	0.0	0.0	0.0	0.3	4.0	14.4	19.6	8.7	3.7	0.2	0.1	0.0		
NO. OF MONTHS	33	33	33	33	32	29	28	30	28	29	32	33		
PERCENT ANNUAL	0.0	0.0	0.0	0.6	7.9	28.2	38.3	17.0	7.3	0.4	0.2	0.0		

MEAN ANNUAL SNOWFALL 51.0 INCHES

Figure A 14. Snowfall file monthly data listing

COEUR D'ALENE 1 E KOOTENAI 10-1956

DAILY SNOWFALL AND SNOW DEPTH ON GROUND IN INCHES

1971-72	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
1					3.0 3		0.0 M	2.0 7				
2							0.0 M	0.0 7	2.0 0			
3						1.0 0	0.0 8	0.0 7				
4							2.5 11	0.0 7				
5						6.0 6	2.5 14	0.0 7				
6						0.0 5	0.0 11	M 7				
7						0.0 5	0.0 7	0.0 4				
8						1.0 6	0.0 M	0.0 4				
9						7.0 13	0.0* M	0.0 3				
10						0.0 13	4.0 10	0.0 3				
11						0.0* M	4.0 10	0.0 3				
12						0.0* M	5.C 13	0.0 2				
13						5.0 18	0.0 M	0.0 1				
14						5.0 22	1.0 12	0.0 T				
15						1.0 22	0.0 10	M T				
16						2.0 23	0.0 8					
17						0.0 18	0.0 7					
18						0.0 16	1.0 8	M M				
19						0.0 14	0.0 8	0.0 M				
20						1.0 13	0.0 4	0.0 M				
21						0.0 9	0.0 2	0.0 M				
22						0.0 8	0.0 2	M M				
23					2.0 2	0.0 8	0.0 2	0.0 M				
24						0.0 8	0.0 2	T M				
25						0.0 8	8.0 10	0.0 M				
26						T 8	0.0 10	0.0 M				
27						T 8	0.0 M	0.0 M				
28						0.0 8	0.0 M	0.0 M	2.0 0			
29						4.5 13	0.0 M	0.0 M				
30						0.0 M	0.0 M					
31				3.0 0		0.0 12	2.0 8					
TOTAL				3.0	5.0	33.5	30.0	2.0	4.0			

Figure A 15. Snowfall file daily data listing

13 Contents of the peak flow file

The command sequence

```
ACCESS
ELEMENT      PEAKFLOW
STATION      13337500
LIST         CONTENTS
```

produced the output shown in Figure A 16. A heading page to identify the codes is also produced.

The following codes are used:

BW - Gage height was due to backwater
NM - Not maximum gage height for water year
MD - Discharge given is a maximum daily
ES - Discharge estimated from another site
DF - Discharge given due to dam failure
LT - Actual discharge is less than indicated value
UR - Unknown effect of regulation or diversion
KR - Known significant effect of regulation or diversion

The data for this listing, and the format of the listing were obtained from the U.S. Geological Survey.

SOUTH FORK CLEARWATER RIVER NEAR ELK CITY, IDA   IDAHO   STATION 13.3375.00

DRAINAGE AREA = 261
GAGE DATUM = FT.

WATER YEAR	ANNUAL PEAK DISCH,CFS	DATE	CODES	HIGHEST SINCE	GAGE HEIGHT OF ANNUAL PEAK,FT	CODE	ANNUAL MAX GAGE HT,FT	DATE	CODE
1945	1470	05-04-45							
1946	1230	04-19-46							
1947	2200	05-09-47							
1948	3700	05-29-48	MD						
1949	2200	05-16-49							
1950	1720	05-16-50			5.39				
1951	1280	05-12-51			4.72				
1952	1740	04-28-52			5.28				
1953	1460	04-28-53			5.02				
1954	1180	05-10-54			4.51				
1955	1980	05-21-55			5.60				
1956	2200	04-23-56							
1957	2120	05-21-57			5.85				
1958	1690	04-20-58			5.11				
1959	1770	05-16-59			5.35				
1960	1660	04-09-60			5.22	NM	6.88	03-27-60	
1961	1630	05-26-61			5.12				
1962	2240	04-20-62			5.87				
1963	1540	05-08-63			5.07				
1964	4040	06-08-64			7.48				
1965	3060	05-01-65			6.24				
1966	1130	05-07-66			4.12				
1967	2380	05-23-67			5.69				
1968	1360	02-23-68			4.43	NM	5.34	02-19-68	BW
1969	2200	04-24-69			5.42				
1970	2440	05-19-70			5.71				
1971	3270	05-05-71			6.58				
1972	3220	05-17-72			6.77				
1973	706	06-14-73			3.61				

Figure A 16. Annual peak streamflow file listing

14. Hourly listings from hourly rainfall file

The command sequence

```
ACCESS
ELEMENT      HOURRAIN
STATION      456789
PERIOD       3/1951 To 3/1951
LIST         HOURLY
```

produced the output shown in Figure A 17.

Values in the table are hourly precipitation amounts in inches for the hour ending at the time shown (on a 24-hour clock). Amounts are qualified by the following special symbols:

- -- amount missing;
- S measurement is of melting snow;
- * amount accumulated;
- E amount estimated;
- T trace reported.

Only one symbol is printed for one hour, and the symbol is selected in the above order.

15. Daily listings from hourly rainfall file

The command sequence

```
ACCESS
ELEMENT      HOURRAIN
STATION      456789
PERIOD       1/1951 To 12/1951
LIST         DAILY
```

will produce output similar to Figure A 9.

Values in the table are total daily precipitation amounts in inches, measured from midnight to midnight. Amounts are qualified by the following special symbols:

- -- amounts for entire day missing;
- \- missing amounts during day;
- S melting snow measured during day;
- * accumulations during day;
- E estimated values during day;
- T trace total for day.

Only one symbol is printed for one day, and the symbol is selected in the above order. Thus if a minus sign appears, there may also be accumulations or estimated values during the day, but if an E is printed, there are neither missing values nor accumulations.

Monthly totals are also printed.

PULLMAN 2 NW WHITMAN 45-6789

HOURLY PRECIPITATION IN INCHES

MARCH, 1951

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
1													--	--	--	--	--	--	--	--	--	--	--	--	
2																									
3												0.02	0.03	0.02	0.04	0.07	0.08	0.05	0.05	0.05	0.06	0.02	0.01	0.08	0.58
4	0.01		0.01			0.01	0.01							0.01	0.01	0.03	0.01	0.03	0.02						0.15
5											0.02														0.02
6					0.01		0.01		0.02																0.04
7		0.02	0.05	0.02																					0.09
8																		0.02	0.01	0.04	0.01				0.08
9																									
10											0.01	0.02	0.02				0.01								0.06
11																									
12		0.01	0.01	0.02	0.01	0.01		0.01	0.01			0.02					0.03	0.02	0.03		0.03	0.04	0.01	0.01	0.27
13						0.01	0.01																		0.02
14																									
15						0.01	0.03	0.02	0.07	0.17	0.09	0.22													0.61
16																									
17																									
18																									
19																									
20																									
21																							0.01	0.01	0.02
22	0.01																								0.01
23																									
24																									
25																									
26																									
27																									
28																									
29											0.01	0.01	0.04	0.02	0.05										0.13
30																									
31																									

Figure A 17. Hourly precipitation file listing

E. JOB CONTROL CARDS

Each and every submission of a HISARS job requires several cards. The first is a Job Information Card (JIC) stating that disk pack USR001 is to be mounted. This is a white card found in the USER Work Area at the Computer Center. The punch cards are as shown below:

```
//jnumber   JOB    (aaa-bb-cccc,actno,lines),'user',TYPRUN=HOLD
//          EXEC   HISARS
//SYSIN     DD       *
       ----  HISARS    DATA    CARDS  ----
/*
```

It may be well to note that all the data sets referred to by the HISARS PROC above are stored on a private magnetic disc pack. Since this pack must be mounted before the program can be run, turn-around time may be expected to be relatively slow. Batching of jobs is desirable.

Card formats for the job control language are specified by the system, and must be followed rigorously. In particular, blanks are permitted only at points that are clear in the example above, and not otherwise. The number of blanks at any point is arbitrary, however.

1 The JOB Card

The JOB card must be the one supplied by Computer Services and available in the User Work Area. This card has already punched on it the jnumber and word JOB. aaa-bb-cccc is the user's Social Security number, actno is any valid account number (assigned by Computer Services), lines is the number of output lines in 1000's (5 = 5000 lines output, 4000 is default), and user is the user's name. In addition, a TIME parameter may also be punched if more than 60 seconds is required for execution. TYPRUN=HOLD is required and must be punched exactly as shown.

2 The EXEC Card

The EXEC card calls the HISARS PROC and sets up all required file space.

3. The SYSIN card

The SYSIN card indicates that the HISARS command cards are to follow. The HISARS cards are thus placed between this card and the /* card.

4. The /* card

The /* card indicates that the HISARS command cards have all been read and the job terminated.

5. The file cards

If, and only if, water temperatures for the evaporation pans are desired, insert the following two cards between the EXEC and SYSIN cards

```
//ITEM  DD  DSN=IDAHO.INDEX.PANTEMP,DISP=SHR,UNIT=DISK,VOL=SER=USR001

//RTEM  DD  DSN=IDAHO.DATA.PANTEMP,DISP=SHR,UNIT=DISK,VOL=SER=USR001
```

When this is done, the air temperature DD cards are overridden and the air temperature files cannot be accessed during that jobstep. It should be noted that these data are very few and very poor.

II. HISARS USERS' GUIDE: THE PROCESS FACILITIES

A. INTRODUCTION

The processing facilities of HISARS are designed to permit routine types of analysis on data elements stored by the system. Thus the prospective user need not become involved in the complexities of programming and data manipulation in order to obtain the practical results required.

Processing is carried out on data identified by the preceding access group. Acquaintance with the access facilities of HISARS is therefore prerequisite for use of the processing facilities (see Section I.A).

Programs have been selected that are thought to cover most users routine uses. Suggestions for additional programs are welcome. A large number of additional programs are planned and will be added as time becomes available and specific needs are recognized.

The following illustrate the combined uses of the access and processing facilities.

Ex. 1: To obtain a statistical summary of daily rainfall for all rainfall stations in Power County.

```
ACCESS
ELEMENT      RAINFALL
COUNTY       POWER
PROCESS
DAILY STATISTICS
```

Ex. 2: To make a computation of minimum flow for various periods, for station 13.1850.00 and 13.3450.00 during the common period October 1931 to September 1960, with results converted to a unit area basis.

```
ACCESS
ELEMENT        STREAMFLOW
STATION        13185000
               13345000
PERIOD         10/1931 To 9/1960
PROCESS
MINIMUM FLOW ANALYSIS
               13185000    AREA = 830     LENGTH = 7,30
               13345000    AREA = 317     LENGTH = 7,30
```

B. THE COMMAND LANGUAGE

The following commands constitute the process facilities of HISARS:

```
PROCESS
(Process Request card)
   (Optional Parameter cards)
```

The command word PROCESS is punched starting in Column 1. Information in the Process Request card must start in Column 1, but information in the Optional Parameter cards must start in Column 2 or later.

A PROCESS card followed by a Process Request card and Optional Parameter card constitutes a single process group. Several process groups may follow a single access group, in which case all processing is carried out on the same data.

1. The Processing request card

The Process Request card must contain one or more names that identify the types of processing requested. Permissible names are given with the program specifications in Section II.C. The only formatting restrictions are that the first name must start in Column 1, and not more than one card may be used. Information on multiple processing requests is given in Section II.D.1.

2. Optional parameter card

Some of the processing programs do not require any parameters for execution, whereas others require one or more parameters. Parameter requirements are given in the program specifications in Section II.C. The specifications also list default values that will be supplied automatically unless replaced by the user. Thus, if no parameter cards are included in the access group, standard system defaults will be used.

If the user wishes to provide parameter values, he needs to give only those values which are not satisfactory by default. Two further options exist:

a) Data for all stations are to be processed using the same values. In this case, only one group of parameter cards is used, and the list of parameters applies to all stations.

b) Different parameter values are required for each station. In this case, one group of parameter cards is used for each station, and the parameters apply to that station (but see Section II.D.3 for optional usage). The station number is punched first on the first card, starting in Column 2 or later, and the list of parameters follow. The parameter cards must be ordered so that the station numbers are in the same order as retrieved by the access group. The second example in Section II.A uses this format.

The list of parameters for either case contains the identifying name and value for each parameter. Column 1 may not be used, but the only other formatting requirement is that the name and value must each be punched without intervening spaces. The parameters may be punched in any order, and punctuation between parameters is optional.

The list of parameters will normally be punched on a single card. However, particularly when using the LENGTH or CLASS parameters, the length of the list may be too long for a single card. In this case, the list can be interrupted at any convenient point and continued on the next card, subject to two conventions:

a) A numerical value cannot be split across two cards:

b) The identification of the parameter being continued must be repeated on the second and following cards, leaving Col. 1 blank.

An example of this usage is shown in Section II.C.9 below.

C. PROCESSING PROGRAMS

Following is a listing of the processing programs now implemented in HISARS. For each program, the following are given:

a) NAME - the standardized name to be used on the Processing Request card;
b) INPUT - the data files which can be used to provide data for the program;
c) OUTPUT - identification of output results obtained from the program;
d) OPTIONS - optional features that are controlled by parameters. Standard default values are also given;

e) An example showing the complete set of HISARS cards required and consequent output.

Several of the programs permit limiting the months for which the analysis is carried out. Assuming the sequence January-December followed by Annual, processing can begin with any month and terminate with the same or any later month. The form of this parameter can best be illustrated by examples:

a) ONLY APRIL TO JULY - will result in processing only of the months April, May, June, July;

b) ONLY MARCH - will result in processing only for March;

c) ONLY ANNUAL - will result in processing only for the entire year combined, i.e. separate monthly analyses will not be obtained.

1. Statistical analysis

NAME - DAILY STATISTICS or MONTHLY STATISTICS
INPUT - STREAMFLOW or RAINFALL
OUTPUT - the following results are tabulated for each month:

a) Number of observations
b) Proportion of zeros
c) Mean
d) Standard deviation
e) Variance
f) Third moment
g) Fourth moment
h) Serial correlation

OPTIONS - Processing period

Standard Defaults - ONLY JANUARY TO ANNUAL

Note: If DAILY STATISTICS is used, the analysis is made on daily values from the input files. If MONTHLY STATISTICS is used, the analysis is made on monthly totals. In the latter case, the serial correlation is between months, and the number of pairs used for calculation is also given. For streamflow files, months with missing daily values are skipped.

Example: The command sequence

```
ACCESS
ELEMENT      RAINFALL
STATION      100491
PROCESS
MONTHLY STATISTICS
```

produced the output shown in Figure B 1 .

ATLANTA ELMORE STATION NO. 10-0491

STATISTICAL ANALYSIS OF MONTHLY RAINFALL
01/1962 TO 12/1973

MONTH	NUMBER OF OBS.	PROPORTION OF ZEROS	MEAN	STANDARD DEVIATION	VARIANCE	THIRD MOMENT	FOURTH MOMENT	SERIAL CORRELATION
JANUARY	12	0.0833	4.7083E+00	3.5279E+00	1.2446E+01	1.9137E+01	2.8969E+02	0.5830 (11)
FEBRUARY	12	0.0000	2.4608E+00	1.2708E+00	1.6148E+00	9.6183E-01	6.1586E+00	0.0129 (12)
MARCH	12	0.0000	1.9642E+00	9.2696E-01	8.5926E-01	2.0992E-01	2.6707E+00	-0.1041 (12)
APRIL	12	0.0833	1.6167E+00	8.6060E-01	7.4064E-01	-6.0986E-02	1.3431E+00	0.3644 (12)
MAY	12	0.0000	1.2550E+00	1.0633E+00	1.1305E+00	1.7929E+00	6.4892E+00	0.2974 (12)
JUNE	12	0.0833	2.1683E+00	1.4793E+00	2.1882E+00	2.0661E-01	9.1728E+00	0.1369 (12)
JULY	12	0.1667	3.8667E-01	3.9815E-01	1.5852E-01	3.5237E-02	4.2080E-02	0.4991 (12)
AUGUST	12	0.0833	9.4583E-01	1.1352E+00	1.2886E+00	2.3029E+00	7.5081E+00	-0.2210 (12)
SEPTEMBER	12	0.0000	1.2025E+00	5.1064E-01	2.6075E-01	2.4562E-02	1.6115E-01	0.2540 (12)
OCTOBER	12	0.0833	1.3283E+00	1.0068E+00	1.0136E+00	3.2853E-01	1.7150E+00	0.5205 (12)
NOVEMBER	12	0.0000	3.3967E+00	1.5047E+00	2.2640E+00	-8.6353E-02	1.2374E+01	0.1322 (12)
DECEMBER	12	0.0000	4.0125E+00	2.9324E+00	8.5992E+00	4.0888E+01	3.9224E+02	0.3439 (12)
ANNUAL	144	0.0486	2.1205E+00	2.0710E+00	4.2892E+00	1.8849E+01	1.6881E+02	

Figure B 1. Statistical analysis of monthly precipitation data output

2. Frequency analysis

NAME - DAILY FREQUENCY or MONTHLY FREQUENCY

INPUT - STREAMFLOW or RAINFALL

OUTPUT - Tabulation of standard statistics, including those given in the statistical summary, as well as deciles and quartiles. A plot of the cumulative frequency distribution is also printed. There is separate output for each month, and also for the entire year.

OPTIONS - Processing period
RANGE - the limits of the frequency plot
Standard Defaults - ONLY JANUARY TO ANNUAL
Daily streamflow -
RANGE 0 To 1000
Monthly streamflow -
RANGE 0 To 10000
Daily rainfall -
RANGE 0 To 1
Monthly rainfall -
Range 0 To 10

Note: The values of the RANGE parameter are the limits of the plot of the cumulative frequency distribution. This does not affect computation of the statistics. For streamflow files, months with missing daily values are skipped.

Example: The command sequence

```
ACCESS
ELEMENT      RAINFALL
STATION      106152
PROCESS
DAILY FREQUENCY
     ONLY FEBRUARY    RANGE 0 To 0.5
```

produced the output shown in Figure B 2.

MOSCOW-UNIV OF IDAHO LATAH STATION NO. 10-6152

FREQUENCY ANALYSIS OF DAILY RAINFALL FOR THE MONTH OF FEBRUARY
01/1900 TO 12/1973

MAXIMUM VALUE =	1.40			S(X) =	1.5353E+02
UPPER DECILE =	0.25	NUMBER OF OBS. =	2090	S(X*X) =	5.8595E+01
UPPER QUARTILE =	0.09	MEAN =	0.073	S(X*X*X) =	3.5795E+01
MEDIAN =	0.00	STD. DEVIATION =	0.150	S(X*X*X*X) =	2.9442E+01
LOWER QUARTILE =	0.00	SKEWNESS =	3.447	3RD MOMENT =	1.1740E-02
LOWER DECILE =	0.00	KURTOSIS =	16.267	4TH MOMENT =	9.8749E-03

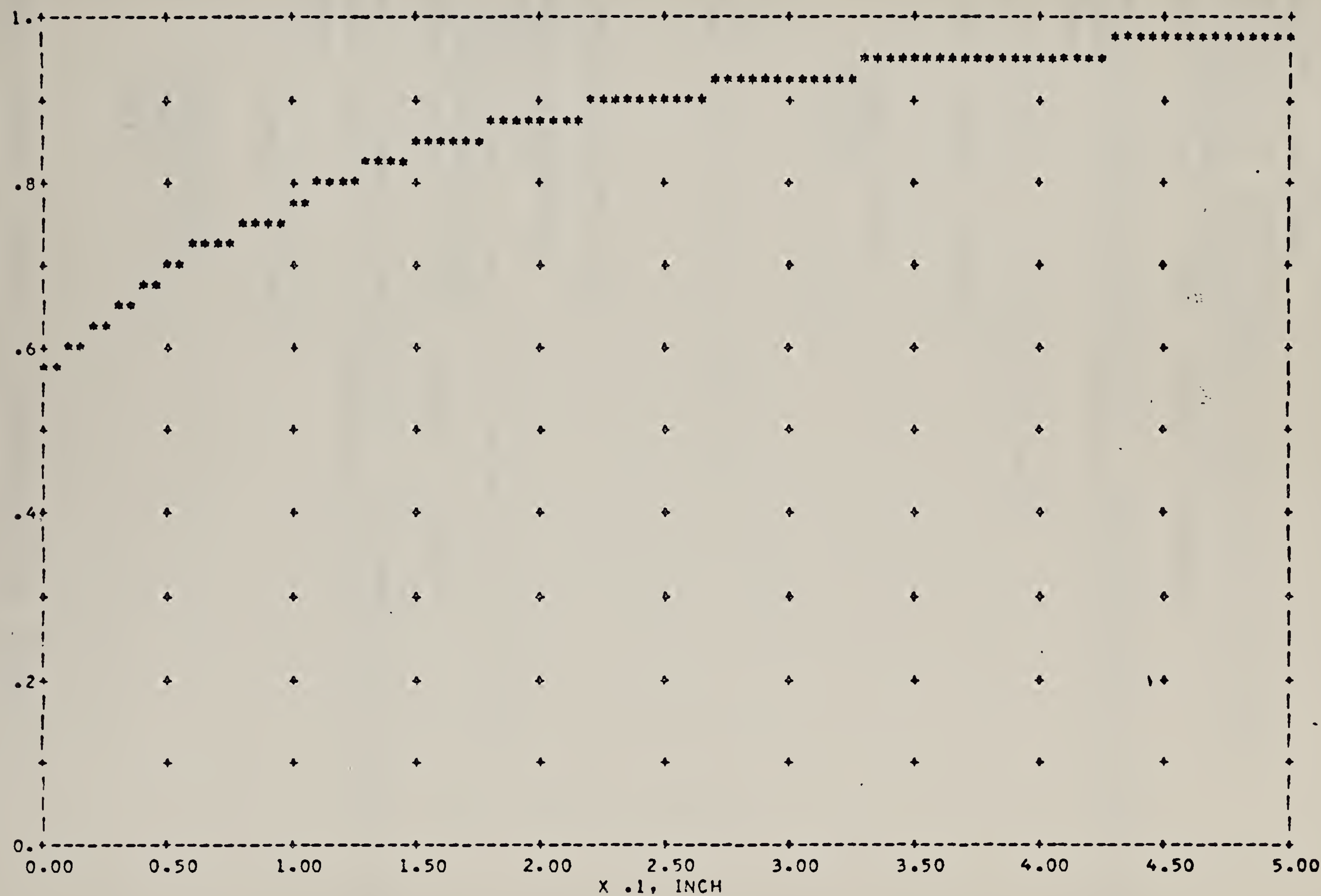


Figure B 2. Frequency analysis of daily precipitation data output

3. Highest/maximum value

NAME - HIGHEST or MAXIMUM
INPUT - RAINFALL or TEMPERATURE
OUTPUT - Tabulation of the highest value for each month
OPTIONS - Processing period
  Standard Default - ONLY JANUARY TO ANNUAL

Note: Choice of names is arbitrary. For temperature files, the highest values of the maximum and minimum temperatures are given.

An M indicates an incomplete month.

Example: The command sequence

```
ACCESS
ELEMENT      TEMPERATURE
STATION      106152
PERIOD       1/1955 To 12/1972
PROCESS
MAXIMUM
```

produced the output shown in Figure B 3.

4. Lowest/minimum value

NAME - LOWEST or MINIMUM
INPUT - TEMPERATURE
OUTPUT - Tabulation of the lowest value for each month.
OPTIONS - Processing period
  Standard Default - ONLY JANUARY TO ANNUAL

Note: Choice of names is arbitrary. For temperature files, the lowest values of the maximum and minimum temperatures are given.

Example: The command sequence

```
ACCESS
ELEMENT      TEMPERATURE
PERIOD       1/1955 To 12/1972
STATION      106152
PROCESS
MINIMUM
```

would produce output similiar in appearance to Figure B 3 .

MOSCOW-UNIV OF IDAHO LATAH STATION NO. 10-6152

HIGHEST DAILY MAXIMUM AND MINIMUM TEMPERATURES IN DEGREES F.

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL
1955	43	47	54	68	75	94	97	94	95	73	57	51	97
	36	34	39	41	52	58	66	64	55	51	43	38	66
1956	49	49	59	79	86	85	98	99	87	69	57	52	99
	37	35	40	50	57	53	67	65	60	47	43	40	67
1957	42	53	60	80	83	88	94	90	91	75	54	50	94
	32	40	41	48	66	60	63	56	58	53	40	38	66
1958	47	63	63	69	90	93	98	98	95	80	55	58	98
	36	48	40	44	56	63	68	65	57	52	42	41	68
1959	51	47	58	70	83	87	102	97	92	71	62	49	102
	39	37	41	50	58	57	68	59	66	51	41	36	68
1960	48	48	72	72	82	85	103	95	89	82	55	48	103
	37	37	44	47	56	57	65	58	55	52	39	35	65
1961	46	54	61	71	87	96	98	109	79	79	57	46	109
	40	42	45	48	52	59	63	69	51	51	40	36	69
1962	51	58	57	79	70	89	95	96	88	80	60	51	96
	36	38	41	52	50	52	60	59	54	49	45	40	60
1963	44	56	67	74	81	90	88	95	92	85	63	42	95
	37	41	42	46	56	57	56	63	60	52	48	32	63
1964	46	45	67	63	83	82	96	90	82	82	60	51	96
	37	32	42	47	56	58	63	60	50	50	45	39	63
1965	50	56	67	72	81	86	95	98	79	80	65	52	98
	38	36	37	51	52	53	62	68	50	52	43	41	68
1966	49	49	70	71	90	82M	90	100	94	78	57	48	100
	36	33	45	47	53	53M	58	69	62	50	44	40	69
1967	52	55	53	62	80	86	103	100	98	75	57	48	103
	38	41	40	39	58	60	69	62	62	52	47	35	69
1968	49	61	64	79M	83	89	97	92	90	72	56	53	97
	37	44	48	45M	50	57	59	54	56	47	42	35	59
1969	42	42	65	76	83	89	94	98	92	73	57	47	98
	35	34	43	49	57	62	61	57	59	45	42	38	62
1970	46	54	53	60	83	94	95	99	84	83	60	49	99
	37	39	40	38	51	72	62	66	55	50	40	39	72
1971	58	56	54	69	82	88	96	100	85	80	55	44	100
	44	37	38	44	51	57	63	65	54	52	43	32	65
1972	46	56	65	70	85	89	93	101	86	73	52	52	101
	34	44	43	42	55	60	63	67	52	45	43	38	67
PERIOD	58	63	72	80	90	96	103	109	98	85	65	58	
	44	48	48	52	66	72	69	69	66	53	48	41	

HIGHEST MAXIMUM 109 DEGREES F.
HIGHEST MINIMUM 72 DEGREES F.

Figure B 3. Highest daily maximum and minimum temperature output

5. Extreme values

NAME - EXTREME
INPUT - TEMPERATURE
OUTPUT - Tabulation of the extreme values for each month.
OPTIONS - Processing period
Standard Default - ONLY JANUARY TO ANNUAL

Example: The command sequence

```
ACCESS
ELEMENT     TEMPERATURE
PERIOD      1/1955 To 12/1972
STATION     106152
PROCESS
EXTREME
```

would produce output similiar in appearance to Figure B 3 .

6. Rank ordering

NAME - RANK ORDER
INPUT - STREAMFLOW
OUTPUT - Listing of the n largest amounts and their dates ranked from largest to smallest, where n is five times the number of years.
OPTIONS - Processing period
Standard Default - ONLY JANUARY TO ANNUAL

Note: The default processing period is the entire period of record.

Missing data values are ignored.

Example: The command sequence

```
ACCESS
ELEMENT     STREAMFLOW
STATION     13337500
PROCESS
RANK ORDER
```

produced the output shown in Figure B 4.

SOUTH FORK CLEARWATER RIVER NEAR ELK CITY, IDA IDAHO STATION NO. 13.3375.00

LARGEST DAILY STREAMFLOW IN DESCENDING ORDER (CFS)
10/1944 TO 09/1973
ANNUAL

3700.00	5/29/1948	2410.00	5/ 3/1971	2100.00	4/23/1956	1950.00	4/24/1965	1860.00	5/20/1967
3670.00	6/ 8/1964	2410.00	5/12/1971	2100.00	4/24/1956	1950.00	4/26/1965	1860.00	5/12/1972
3390.00	5/22/1948	2400.00	5/14/1972	2100.00	5/17/1964	1950.00	5/21/1970	1850.00	4/25/1956
3090.00	6/ 9/1964	2390.00	5/20/1964	2100.00	5/21/1972	1950.00	5/30/1972	1850.00	5/30/1964
3000.00	5/23/1948	2390.00	5/21/1964	2090.00	5/22/1967	1940.00	5/22/1964	1850.00	5/17/1965
2950.00	5/17/1972	2380.00	5/11/1971	2080.00	5/18/1970	1940.00	5/ 2/1971	1850.00	5/22/1970
2930.00	5/16/1972	2370.00	4/21/1965	2080.00	5/10/1972	1930.00	5/ 5/1947	1840.00	5/12/1949
2900.00	5/27/1948	2350.00	5/19/1972	2070.00	6/ 4/1964	1930.00	5/22/1957	1830.00	5/15/1965
2890.00	5/ 4/1971	2330.00	5/14/1971	2060.00	6/ 1/1948	1930.00	5/26/1970	1820.00	5/ 3/1947
2890.00	5/ 5/1971	2330.00	5/ 8/1972	2060.00	4/23/1965	1930.00	5/23/1972	1820.00	5/14/1949
2820.00	5/26/1948	2320.00	4/29/1965	2050.00	6/ 5/1964	1920.00	5/13/1949	1820.00	5/27/1970
2810.00	5/20/1948	2320.00	5/ 9/1972	2050.00	5/16/1971	1920.00	5/16/1964	1810.00	5/10/1947
2800.00	5/21/1948	2280.00	6/ 7/1964	2050.00	5/22/1972	1920.00	4/25/1965	1810.00	5/17/1949
2780.00	5/18/1972	2260.00	6/ 3/1964	2040.00	5/15/1971	1920.00	5/25/1970	1810.00	6/ 1/1964
2760.00	5/15/1972	2250.00	5/31/1948	2040.00	5/13/1972	1910.00	5/16/1965	1800.00	6/ 2/1948
2750.00	5/23/1948	2250.00	5/ 2/1965	2040.00	6/ 1/1972	1910.00	5/ 7/1972	1800.00	5/20/1949
2750.00	5/30/1948	2240.00	5/19/1948	2030.00	5/21/1957	1900.00	5/ 4/1947	1800.00	5/22/1955
2750.00	4/30/1969	2240.00	5/19/1970	2030.00	4/24/1969	1900.00	5/15/1949	1800.00	5/17/1970
2730.00	5/ 1/1965	2240.00	5/20/1970	2020.00	4/27/1965	1900.00	5/21/1955	1800.00	5/29/1972
2700.00	5/24/1948	2200.00	5/17/1948	2020.00	5/24/1967	1900.00	4/22/1956	1790.00	4/22/1948
2670.00	5/25/1948	2200.00	5/19/1964	2010.00	5/31/1972	1900.00	6/ 2/1972	1790.00	5/ 6/1972
2610.00	5/13/1971	2200.00	4/22/1965	2000.00	4/20/1962	1890.00	5/29/1964	1780.00	5/ 6/1947
2540.00	5/18/1948	2180.00	5/23/1967	2000.00	6/ 2/1964	1890.00	6/12/1964	1780.00	5/23/1957
2530.00	5/ 8/1971	2160.00	6/11/1964	1990.00	5/16/1949	1890.00	5/ 3/1965	1760.00	6/ 3/1948
2510.00	5/ 6/1971	2160.00	5/20/1972	1970.00	5/ 9/1947	1890.00	5/19/1967	1760.00	5/14/1965
2490.00	5/ 9/1971	2140.00	6/ 6/1964	1970.00	5/28/1964	1880.00	5/21/1967	1740.00	5/ 8/1947
2470.00	6/10/1964	2140.00	4/28/1965	1970.00	5/24/1970	1880.00	5/11/1972	1740.00	5/31/1964
2440.00	5/10/1971	2130.00	5/18/1964	1960.00	5/20/1957	1870.00	5/18/1967	1740.00	4/23/1969
2420.00	5/ 7/1971	2110.00	5/23/1970	1960.00	4/20/1965	1870.00	5/24/1972	1740.00	4/25/1969

Figure B 4. Rank ordering of daily streamflow output

7. Mass analysis

NAME - MONTHLY MASS ANALYSIS or MONTHLY MASS FLOW ANALYSIS
INPUT - STREAMFLOW or RAINFALL
OUTPUT - A plot through time of the accumulated total.
OPTIONS - SCALE - the units per inch of plot
INTERVAL - the number of time units per line of plot
RATE - a specified constant rate
Standard Defaults - INTERVAL = 1
RATE = 0
Monthly streamflow - SCALE = 100000
Monthly rainfall - SCALE = 10

Notes:

a) SCALE - the units are volume units equivalent to the data units. The user is cautioned against selecting too small a value for SCALE, since the axis labeling will repeat so often that the plot will not be visible.

b) INTERVAL - This parameter may be used to reduce the length of the graph, particularly for daily values. Corresponding detail will be lost.

c) RATE - This parameter is designed primarily for streamflow analysis by the Rippl method, but it could also be used for other purposes such as the effect of moving a rain gage. If the value is 0, only the basic plot is produced. If the value is greater than 0, the following additional output is produced:

   i) Plots of a constant rate, extending across periods of deficient accumulation.

   ii) Values of the deficiencies, listed along the right margin in scientific notation.

d) The name MONTHLY MASS FLOW ANALYSIS applies only to the streamflow file. The other name may be used with any file.

Examples: The command sequence

```
ACCESS
ELEMENT       STREAMFLOW
STATION       12414500
PROCESS
MONTHLY MASS ANALYSIS
     SCALE = 1000000     INTERVAL = 3
```

A portion of the output is shown in Figure B 5.

ST. JOE RIVER AT CALDER, IDA SHOSHONE STATION NO.

MASS CURVE OF MONTHLY STREAMFLOW

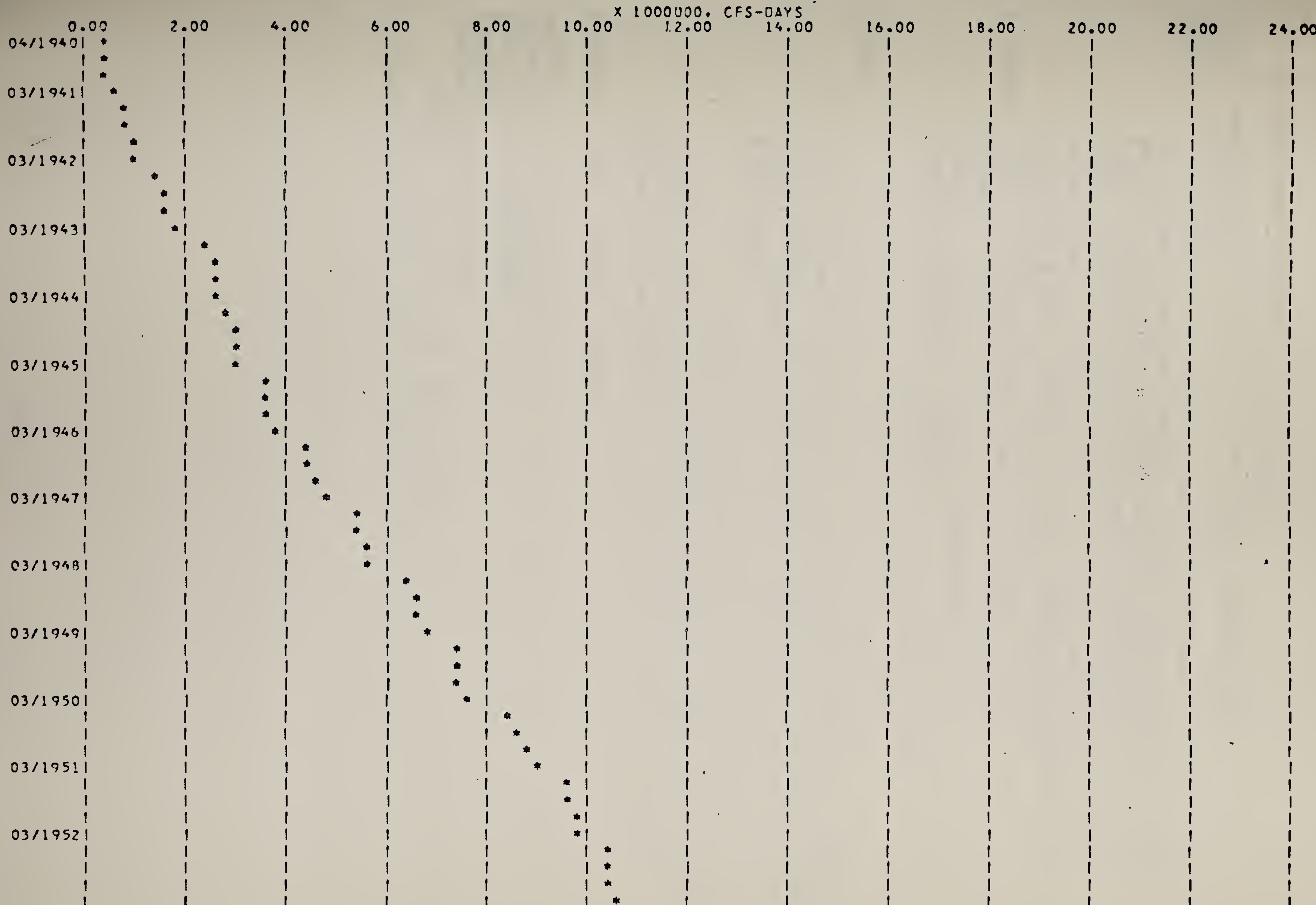


Figure B 5. Mass curve of monthly streamflow output

8. Maximum/minimum flow analysis

NAME - MAXIMUM FLOW ANALYSIS or MINIMUM FLOW ANALYSIS
INPUT - STREAMFLOW
OUTPUT - A listing of the average maximum/minimum flows for each of up to 10 period lengths in days for each year in the period of record. Results are in cubic feet per second (cfs), unless an area is given , in which case the results are converted to cubic feet per second per square mile (cfsm). Statistics of the frequency distribution are also given, and the 10-year frequency discharge is also listed.
OPTIONS - AREA - the drainage area, if results in cfs are desired.
LENGTH - lengths of periods required
Standard Defaults - AREA = 1
LENGTH = 7, 30, 60, 90, 120, 183, 274

Notes:

a) For maximum flow analysis, a water year (October - September) is used. For minimum flow analysis, a climatic year (April - March) is used. Values are listed only for complete years.

b) If a value of AREA is given which is not equal to 1, the drainage area will be obtained from the index entry for the station. If no area is listed in the index, the given value will be used.

Example: The command sequence

```
ACCESS
ELEMENT      STREAMFLOW
STATION      12414500
PROCESS
MINIMUM FLOW ANALYSIS
     LENGTH = 1, 3, 7, 15, 30, 45, 60
```

produced the output shown in Figure B 6.

ST. JOE RIVER AT CALDER, IDA SHOSHONE STATION NO. 12.4145.00

LOW FLOW ANALYSIS FOR YEAR BEGINNING APRIL 1
MEAN MINIMUM DISCHARGE
CFS
LENGTH OF PERICD, DAYS

YEAR	1	3	7	15	30	45	60
1940-41	298.00	300.00	310.29	315.20	333.50	339.29	355.17
1941-42	390.00	395.67	407.29	416.73	440.77	468.20	478.83
1942-43	329.00	333.67	339.00	355.93	364.70	375.80	395.43
1943-44	207.00	269.00	327.14	356.27	369.03	400.44	409.03
1944-45	180.00	190.00	213.57	238.47	302.63	321.36	327.92
1945-46	326.00	327.33	331.71	340.40	386.70	409.98	412.18
1946-47	342.00	343.33	349.43	364.27	382.37	405.69	426.32
1947-48	382.00	386.00	400.00	446.00	473.13	485.27	513.65
1948-49	320.00	343.33	360.00	362.67	369.00	383.78	395.10
1949-50	330.00	331.33	341.43	359.87	395.93	415.93	417.55
1950-51	444.00	445.67	459.00	490.13	513.73	553.51	565.65
1951-52	380.00	384.33	385.57	401.67	441.63	469.64	511.87
1952-53	100.00	116.67	154.00	208.13	255.53	262.07	272.28
1953-54	302.00	303.33	303.71	310.40	321.83	339.04	357.42
1954-55	390.00	423.00	469.00	516.33	574.47	603.40	630.93
1955-56	444.00	460.67	488.29	505.93	531.07	554.80	608.12
1956-57	230.00	256.67	352.86	399.33	443.33	461.16	488.13
1957-58	240.00	283.33	318.14	347.33	364.33	380.24	393.07
1958-59	347.00	353.67	363.57	385.87	408.20	418.40	430.67
1959-60	510.00	513.33	551.43	585.13	622.57	637.71	686.57
1960-61	270.00	280.00	322.86	361.20	415.13	432.96	446.52
1961-62	190.00	210.00	286.57	349.07	383.03	390.82	404.35
1962-63	381.00	389.33	402.14	433.20	457.43	469.18	485.05
1963-64	250.00	306.67	321.57	333.33	348.33	357.11	368.17
1964-65	505.00	510.00	526.43	568.33	581.37	588.89	596.42
1965-66	382.00	394.00	405.43	423.27	443.60	447.47	467.70
1966-67	308.00	330.00	337.86	349.13	361.80	372.36	381.42
1967-68	330.00	333.33	338.86	355.80	392.60	409.07	425.88
1968-69	496.00	499.00	506.71	548.40	605.43	623.27	681.85
1969-70	250.00	250.00	253.57	269.87	324.53	354.24	360.35
1970-71	390.00	399.67	410.00	448.80	465.57	469.82	474.57
M	2.49703	2.51874	2.54998	2.58169	2.61563	2.63309	2.65039
S	0.14988	0.13380	0.11279	0.10234	0.09146	0.09016	0.09483
G	-1.28905	-1.33432	-1.00511	-0.34304	0.15817	0.10405	0.23755
Q 10	197.76	218.54	250.46	280.13	316.29	330.07	340.04

Figure B 6. Low flow analysis output

9. Flow duration table

NAME - FLOW DURATION TABLE
INPUT - STREAMFLOW
OUTPUT - A tabulation of the number of days that the flow was within various class intervals for each complete water year. A second table gives the frequency of discharge greater than or equal to each class interval. Class intervals are listed in cubic feet per second, in cubic feet per second per square mile, and as a ratio to the mean daily discharge.
OPTIONS - CLASS - upper limits of class intervals
    Standard Defaults - CLASS = 1, 10, 100, 1000, 10000, 100000, 1000000

Notes:

a) A maximum of 32 class intervals may be specified.

b) The drainage area is obtained from the index entry for the station. If no area is given in the index, the column of class intervals in cubic feet per second per square mile will be omitted.

c) Days with missing values are not counted.

Example: The command sequence

```
ACCESS
ELEMENT     STREAMFLOW
STATION     12414500
PROCESS
FLOW DURATION TABLE
     CLASS  70 100 150 200 250 300 400 500 700 1000 2000
     CLASS  2500 3000 4000 5000 7000 10000 15000 20000
```

produced the output shown in Figure B 7.

FLOW DURATION TABLE

CLASS / WATER YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	NUMBER OF DAYS IN CLASS																		
1941	0	0	0	0	0	42	59	54	63	70	36	20	17	2	2	0	0	0	0
1942	0	0	0	0	0	9	23	40	67	98	20	29	40	20	11	8	0	0	0
1943	0	0	0	0	0	35	25	71	69	49	5	4	6	11	47	28	15	0	0
1944	0	0	0	1	7	106	76	58	22	31	14	16	20	11	4	0	0	0	0
1945	0	0	3	10	19	75	30	45	39	58	15	14	11	10	16	10	10	0	0
1946	0	0	0	0	0	34	32	92	47	57	11	17	14	5	14	28	14	0	0
1947	0	0	0	0	0	19	30	44	25	83	28	21	34	25	28	12	13	2	1
1948	0	0	0	0	0	1	10	34	49	159	24	11	8	6	13	17	21	7	6
1949	0	0	0	0	0	58	67	70	29	49	11	8	7	9	14	22	13	8	0
1950	0	0	0	0	0	22	23	57	46	69	18	10	21	16	22	25	30	6	0
1951	0	0	0	0	0	10	27	38	22	110	33	20	21	20	25	33	6	0	0
1952	0	0	0	0	0	9	33	90	75	63	15	11	9	11	11	31	5	3	0
1953	0	4	3	8	41	53	20	25	35	72	18	12	10	6	23	27	8	0	0
1954	0	0	0	0	0	46	19	67	52	64	14	8	12	11	32	19	14	7	0
1955	0	0	0	0	0	2	15	107	78	59	12	9	20	7	23	20	11	2	0
1956	0	0	0	0	0	1	20	35	63	101	19	20	25	11	11	18	25	16	1
1957	0	0	0	1	2	39	57	69	35	47	18	14	12	14	19	13	19	6	0
1958	0	0	0	1	4	69	63	62	27	40	16	17	12	12	8	17	17	0	0
1959	0	0	0	0	0	8	15	45	26	86	45	21	23	12	34	34	16	0	0
1960	0	0	0	0	0	9	21	28	60	113	20	13	16	17	38	24	7	0	0
1961	0	0	0	0	4	25	71	67	23	46	8	16	22	20	19	22	22	0	0
1962	0	0	2	3	2	29	75	65	49	43	7	5	9	12	17	39	8	0	0
1963	0	0	0	0	0	23	32	42	46	83	25	19	42	24	28	1	0	0	0
1964	0	0	0	0	1	110	42	59	26	27	10	12	18	10	12	15	16	8	0
1965	0	0	0	0	0	0	12	82	29	84	38	22	15	12	21	31	14	3	2
1966	0	0	0	0	0	24	71	101	32	42	6	6	20	21	27	9	6	0	0
1967	0	0	0	0	0	52	26	45	42	85	18	20	25	4	13	22	11	2	0
1968	0	0	0	0	0	8	13	71	67	74	22	19	24	27	31	9	1	0	0
1969	0	0	0	0	0	21	26	23	62	106	29	9	10	5	30	28	14	2	0
1970	0	0	0	0	13	50	48	43	26	80	26	11	12	7	14	15	20	0	0

TOTAL DISCHARGE 26182551.00 CFS-DAYS
MEAN DAILY DISCHARGE 2389.57 CFS
DRAINAGE AREA 1030 SQ MI

CLASS	CFS	TOTAL COUNTS	ACCUM	PERCENT	CFS/ SQ MI	CFS/ MEAN DAILY
1	70	0	10957	100.0	0.1	0.0
2	100	4	10957	100.0	0.1	0.0
3	150	8	10953	100.0	0.1	0.1
4	200	24	10945	99.9	0.2	0.1
5	250	93	10921	99.7	0.2	0.1
6	300	989	10828	98.8	0.3	0.1
7	400	1081	9839	89.8	0.4	0.2
8	500	1729	8758	79.9	0.5	0.2
9	700	1331	7029	64.1	0.7	0.3
10	1000	2148	5698	52.0	1.0	0.4

CLASS	CFS	TOTAL COUNTS	ACCUM	PERCENT	CFS/ SQ MI	CFS/ MEAN DAILY
11	2000	581	3550	32.4	1.9	0.8
12	2500	434	2969	27.1	2.4	1.0
13	3000	535	2535	23.1	2.9	1.3
14	4000	378	2000	18.3	3.9	1.7
15	5000	607	1622	14.8	4.9	2.1
16	7000	577	1015	9.3	6.8	2.9
17	10000	356	438	4.0	9.7	4.2
18	15000	72	82	0.7	14.6	6.3
19	20000	10	10	0.1	19.4	8.4

DRAINAGE AREA 1030 SQ MI

Figure B 7. Flow duration analysis output

10. Flow duration curve

NAME - FLOW DURATION CURVE
INPUT - STREAMFLOW
OUTPUT - A plot of the frequency of discharge greater than or equal to given rates plotted in cubic feet per second, cubic feet per second per square mile, and as a ratio to mean discharge.
OPTIONS - CLASS - upper limits of class intervals
Standard Defaults - CLASS = 1, 10, 100, 1000, 10000, 100000, 1000000

Notes: (same as for the flow duration table, II.C.9.

Example: The command sequence

```
ACCESS
ELEMENT     STREAMFLOW
STATION     12414500
PROCESS
FLOW DURATION CURVE
     CLASS 70 100 150 200 250 300 400 500 700 1000 2000
     CLASS 2500 3000 4000 5000 7000 10000 15000 20000
```

produced the output shown in Figure B 8.

11. Interstation correlation

NAME - CORRELATION
INPUT - RAINFALL
OUTPUT - Tabulations of cross correlations between daily values for each pair of up to 10 stations, with the number of pairs of days used in the calculations. Results are listed separately for each month.
OPTIONS - PROCESSING PERIOD
Standard Default - ONLY JANUARY TO ANNUAL

Example: The command sequence

```
ACCESS
ELEMENT     RAINFALL
STATION     100491  101663  102385  108676
PERIOD      07/1966 To 12/1973
PROCESS
CORRELATION
     ONLY MAY
```

produced the output shown in Figure B 9.

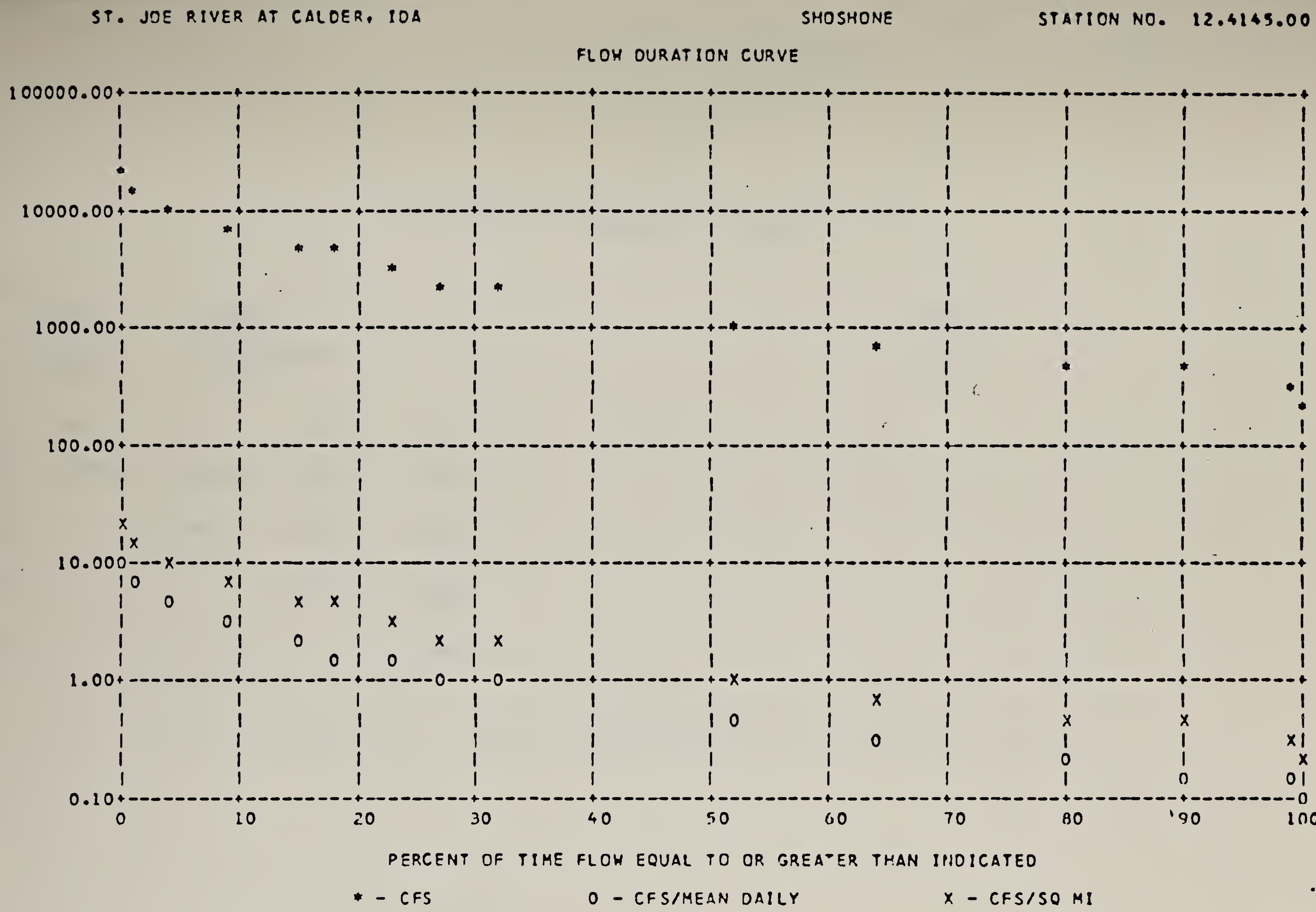


Figure B 8. Flow duration curve output

CORRELATION ANALYSIS OF DAILY RAINFALL - MAY
07/1966 TO 12/1973

STATIONS:

0491	10-0491	ATLANTA	ELMORE
1663	10-1663	CHALLIS	CUSTER
2385	10-2385	DEADWOOD DAM	VALLEY
8676	10-8676	STANLEY	CUSTER

	0491	1663	2385	8676
0491	1.0000	0.3482 155	0.6787 155	0.5050 93
1663		1.0000	0.3543 217	0.4729 155
2385			1.0000	0.7882 155
8676				1.0000

Figure B 9. Interstation correlation analysis output

12. Temperature occurrences

NAME - OCCURRENCES
INPUT - TEMPERATURE
OUTPUT - A tabulation of the number of days that the temperature exceeded various threshold amounts for each complete year. The mean number of occurrences per year is also given.
OPTIONS - Processing period
THRESHOLD - the threshold in degrees F.
Standard Defaults - ONLY JANUARY TO ANNUAL
THRESHOLD 80

Notes:

a) A maximum of 10 threshold values may be specified

b) If a processing period is specified, only records during the processing period must be complete.

EXAMPLE: The command sequence

```
ACCESS
ELEMENT      TEMPERATURE
STATION      106152
PROCESS
OCCURRENCES
     THRESHOLD 60 65 70 75 80 85 90
```

produced the output shown in Figure B 10.

MOSCOW-UNIV OF IDAHO | LATAH | STATION NO. 10-6152

NUMBER OF DAYS TEMPERATURE ABOVE

YEAR	60 DEGREES	65 DEGREES	70 DEGREES	75 DEGREES	80 DEGREES	85 DEGREES	90 DEGREES	95 DEGREES	100 DEGREES
1955	148	125	94	74	61	41	20	3	0
1956	161	144	117	90	65	36	15	4	0
1957	159	144	131	98	59	30	3	0	0
1958	177	155	123	97	83	58	26	4	0
1959	152	123	88	68	45	31	11	6	1
1960	185	150	121	94	66	37	21	8	2
1961	157	140	122	98	77	58	33	17	6
1962	164	129	109	86	52	25	13	1	0
1963	176	153	126	102	60	39	15	0	0
1964	163	126	95	67	37	15	1	1	0
1965	176	144	105	71	41	28	10	2	0
1967	152	139	121	105	84	54	26	15	1
1969	164	138	111	90	62	31	4	1	0
1970	143	121	107	93	73	51	28	3	0
1971	151	130	104	79	56	43	30	8	0
1972	162	139	107	78	61	32	14	4	1
1973	162	130	117	91	67	46	27	4	0
MEAN	160.67	134.18	106.58	86.01	55.25	31.69	13.13	3.27	0.33

NUMBER OF COMPLETE YEARS 67

Figure B 10. Air temperature occurrences output

13 Snowfall occurrences

NAME - OCCURRENCES
INPUT - SNOWFALL
OUTPUT - A tabulation of the number of days that the snowfall was equal to or exceeded a threshold amount during snow season (assumed Sept. 1 - Aug. 31), the dates of the first and last snowfall of this magnitude, and the depth of snow on the ground on the first day of December, January, February and March. Averages of these amounts are also given.
OPTIONS - THRESHOLD - the threshold amount in inches
Standard Default - THRESHOLD 1

Notes:

a) Only one threshold value may be specified

b) In calculating the average depth of snow on the ground for the various dates, days for which the depth was missing are not counted.

Example: The command sequence

```
ACCESS
ELEMENT    SNOWFALL
STATION    101956
PROCESS
OCCURRENCES
```

produced the output shown in Figure B 11.

COEUR D'ALENE 1 E KOOTENAI STATION NO. 10-1956

SNOWFALL SEASON	NUM OF DAYS SNOWFALL >= 1.0 INCH	FIRST SNOWFALL >= 1.0 INCH	LAST SNOWFALL >= 1.0 INCH	DEPTH OF SNOW ON FIRST DAY OF: DEC	JAN	FEB	MAR
1948/49	24	11/30/1948	3/16/1949	1	20	22	15
1949/50	29	12/12/1949	5/ 6/1950		M	23	10
1950/51	22	11/20/1950	3/11/1951	5		1	
1951/52	31	11/14/1951	3/19/1952		24	22	18
1952/53	11	12/ 1/1952	2/16/1953	2	2		
1953/54	15	12/ 2/1953	2/19/1954			18	
1954/55	13	12/29/1954	3/10/1955		M	2	16
1955/56	26	11/ 2/1955	3/ 9/1956	1	0	5	M
1956/57	24	11/16/1956	3/17/1957			22	5
1957/58	10	10/22/1957	2/ 5/1958				
1958/59	12	11/18/1958	2/25/1959				
1959/60	13	11/12/1959	3/14/1960		M		M
1960/61	9	11/10/1960	3/13/1961	M	M		M
1961/62	19	11/ 3/1961	3/ 5/1962	M		M	6
1962/63	5	12/28/1962	2/14/1963		M	12	
1963/64	22	12/ 9/1963	4/16/1964		2	4	
1964/65	22	11/12/1964	2/14/1965		10	5	
1965/66	12	11/25/1965	3/21/1966		M	M	2
1966/67	14	11/ 9/1966	3/30/1967				
1967/68	11	11/29/1967	2/17/1968		0	11	
1968/69	12	11/16/1968	2/26/1969		M	M	M
1969/70	21	12/ 9/1969	4/26/1970		16	7	M
1970/71	18	11/27/1970	2/25/1971	M			1
1971/72	25	10/31/1971	3/28/1972		M	7	
1972/73	8	12/12/1972	2/15/1973		1	T	
1973/74	10	11/ 4/1973	12/28/1973	1			

NUMBER OF YEARS RECORDED 75
AVERAGE OBSERVED NUMBER OF DAYS SNOWFALL WAS >= 1.0 INCH 12.92
AVERAGE DEPTH ON DECEMBER 1 : 0.30
AVERAGE DEPTH ON JANUARY 1 : 2.45
AVERAGE DEPTH ON FEBRUARY 1 : 4.13
AVERAGE DEPTH ON MARCH 1 : 1.47

Figure B 11. Snowfall depths occurrences output

14 Daily or monthly occurrence

NAME - DAILY OCCURRENCES or MONTHLY OCCURRENCES
INPUT - RAINFALL
OUTPUT - A tabulation of the number of time periods that the rainfall was equal to or exceeded various threshold amounts for each complete year. The mean number of occurrences per year is also given.
OPTIONS - Processing period
THRESHOLD - the threshold amounts in inches
Standard Defaults - ONLY JANUARY TO ANNUAL
Daily - THRESHOLD 1
Monthly-THRESHOLD 5

Notes:

a) A maximum of 10 threshold values may be specified

b) If a processing period is specified, only records during the processing period must be complete.

Example: The command sequence

```
ACCESS
ELEMENT      RAINFALL
STATION      106152
PROCESS
DAILY OCCURRENCES
     THRESHOLD  .05  .1  .2  .3  .5  1  1.5  2  3
```

produced the output shown in Figure B 12.

MOSCOW-UNIV OF IDAHO LATAH STATION NO. 10-6152

NUMBER OF DAYS RAINFALL EQUALLED OR EXCEEDED

YEAR	0.0 INCH	0.1 INCH	0.2 INCH	0.3 INCH	0.5 INCH	1.0 INCH	1.5 INCH	2.0 INCH	3.0 INCH
1920	83	72	49	31	6	1	1	0	0
1922	85	57	24	12	5	1	0	0	0
1923	91	70	39	26	9	5	1	0	0
1924	73	54	34	22	5	0	0	0	0
1925	83	65	36	20	6	0	0	0	0
1926	87	67	45	30	18	1	0	0	0
1928	74	50	26	18	3	0	0	0	0
1930	75	57	34	24	10	0	0	0	0
1931	81	59	38	23	9	1	1	0	0
1932	103	76	44	34	14	1	0	0	0
1933	96	70	45	33	15	5	2	0	0
1935	80	57	32	10	4	1	0	0	0
1936	86	61	26	16	5	1	0	0	0
1940	102	84	58	32	10	3	0	0	0
1941	100	74	44	28	13	0	0	0	0
1943	75	55	35	21	8	1	0	0	0
1944	61	45	26	15	5	0	0	0	0
1948	100	79	63	42	23	3	0	0	0
1949	73	60	31	19	8	0	0	0	0
1950	115	85	54	33	9	0	0	0	0
1951	81	60	40	27	11	1	0	0	0
1952	65	52	28	14	8	0	0	0	0
1953	96	65	44	30	12	2	0	0	0
1954	88	74	44	27	7	0	0	0	0
1955	97	66	39	20	8	2	0	0	0
1956	87	64	37	20	12	1	0	0	0
1957	83	62	40	20	7	0	0	0	0
1958	105	80	45	23	12	0	0	0	0
1959	92	57	36	26	13	0	0	0	0
1960	90	70	39	23	9	2	0	0	0
1961	111	84	47	31	8	1	0	0	0
1962	90	69	41	20	9	2	0	0	0
1965	74	49	25	17	8	1	0	0	0
1970	104	86	54	38	17	0	0	0	0
1971	107	84	52	36	13	4	1	0	0
1972	112	85	50	31	14	5	1	0	0
MEAN	89.17	66.78	40.11	24.78	9.81	1.25	0.19	0.00	0.00

NUMBER OF COMPLETE YEARS 36

Figure B 12. Precipitation occurrences output

15 High/low occurrences

NAME - HIGH OCCURRENCES or LOW OCCURRENCES
INPUT - TEMPERATURE
OUTPUT - A tabulation of the number of days that the temperature was above/below a threshold amount for each complete year, and the first and last dates of occurrence. For LOW OCCURRENCES, the length of the period in days that the temperature was always equal to or greater than the threshold is also listed.
OPTIONS - Processing period
THRESHOLD - the threshold in degrees F.
Standard Defaults - ONLY JANUARY TO ANNUAL
HIGH - THRESHOLD 90
LOW - THRESHOLD 32

Notes:

a) Only one threshold value may be specified.

b) If a processing period is specified, only records during the processing period must be complete.

Example: The command sequence

```
ACCESS
ELEMENT      TEMPERATURE
STATION      102385
PROCESS
LOW OCCURRENCES
```

produced the output shown in Figure B 13.

DEADWOOD DAM VALLEY STATION NO. 10-2385

YEAR	NUM OF DAYS TEMPERATURE BELOW 32 DEGREES	LAST DAY BELOW 32 DEGREES	FIRST DAY BELOW 32 DEGREES	LENGTH OF PERIOD >= 32 DEGREES
1930	245	7/20/1930	8/21/1930	31
1931	270	7/ 3/1931	8/ 7/1931	34
1932	269	7/ 8/1932	8/ 6/1932	28
1935	282	7/28/1935	8/ 1/1935	3
1936	274	7/26/1936	8/19/1936	23
1938	258	6/19/1938	8/ 2/1938	43
1939	272	7/20/1939	8/ 6/1939	16
1940	236	7/27/1940	8/ 2/1940	5
1942	277	7/29/1942	8/ 1/1942	2
1943	300	7/30/1943	8/ 5/1943	5
1944	280	7/24/1944	8/ 9/1944	15
1945	307	7/31/1945	8/ 1/1945	0
1947	238	7/ 5/1947	8/10/1947	35
1948	254	7/28/1948	8/ 6/1948	8
1949	251	7/29/1949	8/ 8/1949	9
1950	262	7/30/1950	9/11/1950	42
1951	279	7/11/1951	8/13/1951	32
1952	277	7/22/1952	8/16/1952	24
1953	254	7/21/1953	8/ 6/1953	15
1954	273	7/23/1954	8/ 1/1954	8
1955	273	7/29/1955	8/ 4/1955	5
1956	248	7/ 1/1956	8/ 3/1956	32
1957	241	7/18/1957	8/ 2/1957	14
1958	227	6/29/1958	9/ 3/1958	65
1959	247	7/29/1959	8/13/1959	14
1962	257	7/20/1962	8/23/1962	33
1963	216	7/31/1963	8/21/1963	20
1964	259	7/24/1964	8/14/1964	20
1965	258	7/23/1965	8/29/1965	36
1966	253	7/26/1966	8/12/1966	16
1967	250	6/14/1967	8/ 8/1967	54
1968	257	7/23/1968	8/29/1968	36
1969	259	7/ 4/1969	8/ 5/1969	31
1970	253	7/31/1970	8/ 3/1970	2
1971	263	7/12/1971	8/23/1971	41
1972	233	7/23/1972	9/ 1/1972	39
MEAN	259.78			23.22

NUMBER OF COMPLETE YEARS 36

Figure B 13. Minimum air temperature occurrences output

D. OPTIONAL FEATURES

A number of options are available that add to the flexibility of use of the process facilities. While they do not add any features not previously discussed, they do permit somewhat more freedom of use.

1. Multiple processing

In section II.B, the possibility of processing one set of data in several ways was discussed. When this is done using several processing groups, the user retains control of the ordering of the output.

It is also possible, under certain restrictions, to execute several processing programs with a single processing group. This is done by listing more than one name on the Process Request card, and putting all parameters together on the Optional Parameter card.

The programs are assumed to fall into several natural categories, and only programs which are in the same category may be used together. The categories are:

a) General statistics

DAILY STATISTICS	(DA TIS)
MONTHLY STATISTICS	(MON TIS)
DAILY FREQUENCY	(DA FRE)
MONTHLY FREQUENCY	(MON FRE)
HIGHEST OR MAXIMUM	(HIG or MAX)
LOWEST OR MINIMUM	(LOW or MIN)
EXTREME	(EXT)
RANK ORDER	(RAN)
MONTHLY MASS ANALYSIS	(MON MAS)

b) Flow analysis programs

MONTHLY MASS FLOW ANALYSIS	(MON MAS FLO)
MAXIMUM FLOW ANALYSIS	(MAX FLO)
MINIMUM FLOW ANALYSIS	(MIN FLO)
FLOW DURATION TABLE	(FLO DUR TAB)
FLOW DURATION CURVE	(FLO DUR CUR)

c) Multiple-station programs

CORRELATION	(COR)

d) Occurrence programs

OCCURRENCES	(OCC)
DAILY OCCURRENCES	(DA OCC)
MONTHLY OCCURRENCES	(MON OCC)
HIGH OCCURRENCES	(HIG OCC)
LOW OCCURRENCES	(LOW OCC)

The occurrence of a single identifiable name applies it to all possible programs on the card. Thus, if the Processing Request card contained

DAILY AND MONTHLY STATISTICS AND FREQUENCY

four programs would be executed. Similarly, if the card contained

DAILY AND MONTHLY STATISTICS AND MASS ANALYSIS

expected results would be obtained, but a warning message would also be printed that the daily mass analysis was not yet supported.

Programs are executed in order as listed above regardless of ordering on the Processing Request card.

2. Abbreviations

Since the entire words in the names as listed in Section II.C are not required to determine the programs uniquely, only short groups of letters are used to identify the programs. Consequently, it is possible for the user to use these abbreviations if desired.

Abbreviations of the processing program names are given in parentheses in Section II.D.1 above. Any occurrence of the letters in the combinations shown will lead to execution of the corresponding program. Thus, the Process Request card

DAMONTIS FREMAXLOW EXTRANMAS

would lead to execution of every program in the general statistics category (assuming data appropriate to each program were available).

To separate the two distinct uses of the word MAXIMUM and MINIMUM, the word FLO is searched for first. If it is found, only combinations in the flow analysis category will be identified. Otherwise, combinations in the other categories will be identified.

For the parameters also, only the first three letters need be specified. It should be stressed that future additions of processing programs may require that the above abbreviations be changed to conform with the names of new programs. Thus, if errors occur because of the use of abbreviations, just revert to using the full names.

III. HISARS USERS' GUIDE: THE COPY FACILITIES

A. INTRODUCTION

The COPY command is part of the access facility of HISARS. Those records which have been accessed by the preceding group of instructions will be copied onto an external data set. As such, familiarity with the access facilities as described in the Users' Guide to the Access Facilities is prerequisite to application of material in this guide.

The main purpose of the COPY facility is to permit users with programs in other languages to obtain copies of the data for their use. Sample applications are shown for FORTRAN since users of that language would not otherwise be able to access the data files. The user can create a permanent file if one wishes to repeatedly use the same data, or a temporary file can be created that will be deleted at the end of the job.

The PL/I programmer can access the files directly as any ISAM file is accessed. The file formats are available upon request to the author. Should the PL/I programmer desire, the copying facilities can be used as shown in the example but ISAM files will not result, only sequential. A utility is available that will allow an ISAM copy. Again, the author should be contacted.

There are two reasons for separating the guide to the copying facility from the rest of the access commands. First, the user is here assumed to have some competence in a programming language. Secondly, some additional job control language requirements are needed to use the copying procedure. This guide, then, presumes experience in computer use that was not requisite for the access guide.

Five operands are available for use with the COPY command:

INTEGER, INTEGER FORMATTED, REAL, REAL FORMATTED and DIRECT.

a) If the word INTEGER is used, each word in the output file will be a full-word (4 byte) binary integer.
b) If the word REAL is used, each word in the output file will be a single precision floating point number.
c) If the word FORMATTED is used, the output files will be written with format (in the FORTRAN sense). Otherwise, the files will be written without format.
d) If either of the words INTEGER or REAL is used, output records will be organized as described in Section III.B If the word DIRECT is used, output records will be organized exactly as the regular data files are organized (contact the author for formats), except that the indexed sequential access method is not used, the records being organized sequentially. These records can be read in other languages, and they contain all information from the data files, but they are more difficult to use than

the records described in Section III.B. An example of use is given in Section III.C.1 under retrieval in FORTRAN.

B. OUTPUT FILES

1 File Formats

For some files - Streamflow, Rainfall - a single value is copied for each day. For other files - Temperature, Evaporation and Snowfall - two values are copied for each day. Therefore, two different output file formats are used. For the single value format, each record contains 38 words, organized as follows:

Word 1 - Station identification number
Word 2 - Year
Word 2 - Month
Words 4, 5 - Codes (not implemented yet)
Word 6 - Number of days in month
Word 7-37 - Daily values
Word 38 - Monthly total

For the two-value format, each record contains 70 words. The first six words are as above, Words 7-68 contain daily values, and Words 69, 70 contain monthly summaries. A pair of words is used for each day, e.g. Words 7, 8 for day 1, Words 9, 10 for day 2, etc. For each file, the contents of each daily pair and the summary pair are:

Temperature -
Daily A - Daily maximum temperature
Daily B - Daily minimum temperature
Summary A - Monthly average maximum temperature
Summary B - Monthly average minimum temperature

Evaporation -
Daily A - Daily total wind movement
Daily B - Daily total evaporation
Summary A - Monthly total wind movement
Summary B - Monthly total evaporation

Snowfall -
Daily A - Daily total snowfall
Daily B - Depth of snow on ground
Summary A - Monthly total snowfall
Summary B - Blank

In the following examples, any place the dimension (38) appears, it must be replaced with (70) for two-value data.

Scaling varies according to the file item and operand. The table below shows the scaling used:

File Item	Operand INTEGER	REAL
Daily or monthly streamflow	x100	-
Daily or monthly rainfall	x100	-
Daily max or min temperature	-	-
Monthly max or min temperature	x10	-
Daily rainfall	x100	-
Daily or monthly wind movement	-	-
Daily or monthly evaporation	x100	-
Daily or monthly snowfall	x10	-
Daily snow depth	-	-

On output, the records for each station are put in a separate file. To aid in finding the output file, supplemental output is printed. This consists of the station identification, a statement that the records have been copied, and the name of the file on which the copy was made. Names of files are discussed more fully in Section III.D.

Files are copied in the order in which they are accessed. This is determined first by the order of the elements and second by the order of the stations. In the example below, the streamflow file for station 12.3645.00 will be copied first, and the rainfall file for station 10-1645 second. This would be true even if the order of the station numbers was reversed. However, if the order of the elements was reversed, the rainfall file would be written first.

Example: To copy streamflow and rainfall records for stations 12.3645.00 and 10-1645 for the period 1949-1960. Output is to be in the form of fullword floating point numbers.

```
ACCESS
ELEMENT             STREAMFLOW
                    RAINFALL
STATION             12364500
                    101645
PERIOD              1/1941 to 12/1960
COPY                REAL
```

2 Storage requirements

The output format of copied records has been designed to achieve maximum compatibility for several languages. Unformatted records are specified as variable length,blocked, with maximum record length 284 and maximum block length 3128. Formatted records are fixed length, blocked, with record length 380 and

block length 3040. The DCB portion of the DD card is included within HISARS and therefore does not have to be included with the copy DD cards.

Unformatted: DCB=(RECFM=VB, BLKSIZE=3128,LRECL=284)
Formatted: DCB =(RECFM=FB,BLKSIZE=3040,LRECL=380)

Records copied using the DIRECT operand will vary according to the individual file characteristics. Blocking of such records is left to the user.

The following table shows the number of records per block and records per track on the 3330 disk pack and on a 2400 ft. tape at 1600 BPI,

	RECFM	Records per block	LRECL	BLKSIZE	Records per 2400 foot tape	Records per track 3330 Disk Pack
Single value per day						
Formatted	FB	8	380	3040	90,064	32
Unformatted	VB	20	284	3128	220,000	80
Two values per day						
Formatted	FB	8	380	3040	90,064	32
Unformatted	VB	11	284	3128	120,800	44

C. READING THE COPIED RECORDS

After the records have been copied, they can be read by several other languages.

Files created by any of the five operands can be read in FORTRAN or PL/1. A statement must define the storage format, the REWIND or OPEN statement is used to start reading from the beginning of the file, and the appropriate READ statement given.

FORTRAN	PL/I
Nonformatted	Integer
INTEGER DATA(38) REWIND (9) READ (9) DATA	DCL 1 DATA1,2(INFO(6),DATA(32)FIXED BIN(31) DCL IN FILE RECORD INPUT; READ FILE (IN) INTO (DATA1);
	Real
REAL Data (38) REWIND (9) READ (9) DATA	DCL 1 DATA1, 2(INFO(6),DATA(32)) FLOAT BINARY (21); DCL IN FILE RECORD INPUT; READ FILE (In) INTO (DATA1);
Formatted (one value per day, streamflow, rainfall)	
FORMAT (38I10) or	DCL IN FILE STREAM INPUT; DCL DATA (38) FIXED or FLOAT BIN (38); GET FILE (IN) EDIT(DATA)(38-FC10); 38 F (10));
FORMAT (38F10.0)	or GET FILE (IN)EDIT(DATA)(38 E(10,0,5));
Formatted (2 value per day)	
Temperature:	
FORMAT (6110,64I5) or FORMAT (6110,64F5.1)	(6 F(10), 64 F(5)); (6 F(10), 64 F (5,1));
Evaporation:	
FORMAT (6110,64I5) or FORMAT (6110,32(I5,F5.2))	(6 F(10), 64 F(5)); (6 F(10), 32 (F(5),F(5,2)));
Snowfall:	
FORMAT (6110,6415) FORMAT (6110,32(F5.1,I5))	(6 F(10), 64 F(5)); (6 F(10),32 (F(5,1),F(5)));

Direct (evaporation only)

FORTRAN

```
INTEGER * 4  ID,CODE(8),YEAR
INTEGER * 2  DB,STATE,BLK,MONTH,WIND(31),EVAP(31),TW,TE
 REWIND  9
READ(9,15)  DB,STATE,ID,BLK,YEAR,MONTH,CODE,WIND,EVAP,
            TW,TE
15  FORMAT(2A2,2(A4,A2),8A4,64(A2))
```

PL/I

```
DCL  IN FILE RECORD INPUT;
DCL  1 DATA,
     2 (NDY,CODE)BIT(8),
     2  STATION CHAR(4), 2 BLK CHAR(2),
     2 YEAR CHAR(4), 2 MONTH CHAR(2),
     2 DCIDE(32) BIT(8),
     2 (WIND(31),EVAP(31),TW,TE) FIXED BINARY(15);
READ FILE(IN) INTO(DATA);
```

Direct copies of other files can be read using appropriate modification of the above examples. However, it is recommended that whenever possible, unformatted records using the REAL or INTEGER commands be used since it consumes less space and time. Also the bother and worry about the read format is eliminated.

D. JOB CONTROL REQUIREMENTS

Job control requirements for access have been described in Section I.E. Since output files are being created, additional Job Control Language (JCL) cards must be supplied to define the output data sets. These output file cards must be inserted between the EXEC card and the SYSIN card.

It is possible to create up to 26 output files in a single HISARS run. The file names are OUTA, OUTB, . . ., in that order. These must be related to data set names by DD cards in the job control language. Examples of the format of such cards are given below.

There are two types of output files that can be created, permanent and temporary. A permanent file may be kept after the end of the job for as long as the user wishes. This requires that the user meet certain conventions established by the computing center. The prospective user

should therefore discuss requirements with Computer Services. A temporary file is automatically deleted at the end of a job. Because of this, the user does not have to meet any of the computing center conventions, and the facility is readily available.

Generally, a user who has a repeated need for the same data set will choose to create a permanent file. Similarly, a user who is developing a program and requires test data during debugging runs will wish to have a set of data only once, a temporary data set will be preferable. A charge is made for files stored on disk packs, so that a user should check before creating extensive permanent files. There is no charge for temporary files. It may be noted also that the use of FORMATTED operands will more than double storage requirements, although copying cost is not noticeably affected.

1 Permanent Files

Output file cards required to create permanent files should be in the following form:

```
//OUTA DD DSN=aaa.bbb.ccc,UNIT=DISK,
//   SPACE=(TRK,m),DISP=(NEW,CATLG)
```

1) File name OUTA must always be used for the first output file. If additional output files are required, names must be OUTB, OUTC, ..., OUTZ.

2) The DSN is usually a three level qualified name. The first level is the account number to which storage is to be charged. The other two levels are identifiers provided by the user. The last level identifier must be different for each OUTA, OUTB, etc. and must be different from any identifier previously used to store data. It is recommended that bbb be the users name, although this can be omitted.

3) In the SPACE parameter, the number of tracks required must be provided as an integer. This may be calculated as described in Section III.B.2. For example, if 42 months will be stored per track, and 240 months are to be copied, 5.7 tracks are required, rounded up to 6, so that SPACE=(TRK,6).

4) A user may also store data sets on tape. In this case, UNIT=TAPE, the SPACE parameter is left out, and the VOL=SER= number is for a tape. A JIC card and a write label are also required.

5) Since DCB information is provided by HISARS, no such parameter should be given on the DD card, unless the DIRECT operand is used.

6) When file is no longer needed, you <u>must</u> remember to DELETE the file or you will be charged for the space until Computer Services purges the files at the end of the year. This is most easily done using PGM=IEFBR14.

2 Temporary Files

Output file cards required to create temporary files should be in the following form:

```
//OUTA DD DSNAME=&&OUTA,UNIT=DISK,SPACE=(TRK,m),DISP=(NEW,PASS)
```

Note that in this case a temporary data set name is used, identified by the leading ampersands. The only variable information required is the number of tracks in the space parameter, which is calculated as above.

The user who wishes to create temporary files will be executing a two-step job, the first copying the file, and the second executing the program which uses the file.

3 FORTRAN Applications

To illustrate use of HISARS with FORTRAN programs, two examples are given below. These examples show the entire card deck required, including JCL cards, HISARS commands and FORTRAN statements.

The first example produces a listing of daily streamflow similar to that given in Section I.D.4.

```
//jname             JOB
//     EXEC         HISARS
//OUTA      DD       UNIT=DISK,SPACE=(TRK,1),DISP=(NEW,PASS),DSN=&&OUTA
//SYSIN     DD       *
ACCESS
ELEMENT    STREAMFLOW
STATION    12414500
PERIOD     10/1962 to 9/1963
COPY INTEGER FORMATTED
/*
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
//                  EXEC FORTGCLD
//FORT.SYSIN        DD     *
                    REAL YEAR (12,32)
                    INTEGER DATA (38)
                    REWIND 10
                 15 FORMAT (38 I10)
                    DO 23 I=1,12
                    READ (10,15) DATA
                    DO 21 J=1,32
                    K = J + 6
                 21 YEAR (I,J) = 0.01*DATA(K)
                 23 CONTINUE
                    WRITE (6,17) YEAR
                 17 FORMAT (1HO,12F10.2)
                    END
/*
//GO.FT10F001 DD DSN=&&OUTA,DISP=(OLD,DELETE),UNIT=DISK
//GO.SYSIN    DD *
/*
```

The program could also look like this:

```
                    REAL YEAR (12,32)
                    INTEGER DATA (32), INFO (6)
                    REWIND 10
                 15 FORMAT (38I10)
                    DO 23  I=1,12
                    READ (10,15) INFO, DATA
                    DO 21 J=1 TO INFO (6)
                 21 YEAR (I,J) = 0.01 * DATA (J)
                 23 YEAR (I,32) = 0.01 * DATA (32)
                    WRITE (6,17) YEAR
                 17 FORMAT
                    END
```

Many times, the user wants to have all days of the year in a single dimensioned variable such as YEAR(366) rather than YEAR (12,32). This can be done as shown in this FORTRAN example for COPY REAL and a streamflow record 12 months long on a water year basis (October = 1)

```
      DIMENSION YEAR(366), IMO(12), DATA (32), FORM(6)
      DATA IMO/1,32,62,93,124,152,183,213,244,274,305,336/
      REWIND 10
      L = 0
      DO 50 I = 1,12
      READ (10) FORM,DATA
      IDA = FORM (6)
      DO 50 J = 1, IDA
      L = L + 1
   50 YEAR (L) = DATA (J)
      STOP
      END
```

For files which may have missing months (EVAPORATION and SNOWFALL), only months with data are copied so the following strategy must be used:

```
      DO 50 I = 1,12
      MON = FORM (5)
      IDA = FORM (6)
      IYR = FORM (4)
      L = IMO(MON)
      IF (MOD(IYR,4).EQ.0.AND.MON.GT.2.AND.MON.LT.10)
     *LL = L + IDA -1
      K = 0
      DO 50 J = L,LL
      K = K + 1
   50 YEAR (J) = DATA(K)
```

The second example is used to calculate and print monthly weighted average rainfall computed from data for stations 10-4772, 10-5283 and 10-7499 with weights of 0.3, 0.5, and 0.2 respectively.

```
//jname       JOB
//      EXEC  HISARS
//OUTA    DD  DSN=&&OUTA,UNIT=DISK,SPACE=(TRK,2),DISP=(NEW,PASS)
//OUTB    DD  DSN=&&OUTB,UNIT=DISK,SPACE=(TRK,2),DISP=(NEW,PASS)
//OUTC    DD  DSN=&&OUTC,UNIT=DISK,SPACE=(TRK,2),DISP=(NEW,PASS)
//SYSIN   DD  *
ACCESS
ELEMENT  RAINFALL
STATION  104772
         105283
         107499
PERIOD   10/1951 TO 9/1956
COPY     REAL
/*
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
//       EXEC FORTGCLD
//FORT.SYSIN DD  *
         REAL DATAA(38),DATAB(38),DATAC(38)
         REWIND 8
         REWIND 9
         REWIND 10
         DO 19 I=1,60
         READ (8) DATAA
         READ (9) DATAB
         READ (10) DATAC
         NYR=DATAA(2)
         NMO=DATAA(3)
         AVE=0.3*DATAA(38)+0.5*DATAB(38)+0.2*DATAC(38)
      19 WRITE (6,10) NYR,NMO,AVE
      10 FORMAT (I6, I3,F8.2)
         STOP
         END
/*
//GO.FT08F001 DD DSN=&&OUTA,DISP=(OLD,DELETE),UNIT=DISK
//GO.FT09F001 DD DSN=&&OUTB,DISP=(OLD,DELETE),UNIT=DISK
//GO.FT10F001 DD DSN=&&OUTC,DISP=(OLD,DELETE),UNIT=DISK
//GO.SYSIN  DD   *
/*
```

From this example, it is seen that the requested data for each station are on a separate file. If there had been 7 stations, the DD card would have to be named OUTA to OUTG.

4 PL/I Application

The second example of Section 3 could look like this in PL/I:

```
AVE:PROC OPTIONS(MAIN);
  DECLARE  (INA,INB,INC)FILE INPUT RECORD;
  ON ENDFILE(INA) GO TO LAST;
  DECLARE  1 DATAA, 2 (PART1(6),DATA(32))FLOAT BINARY(21);
  DECLARE  1 DATAB LIKE DATAA;
  DECLARE  1 DATAC LIKE DATAA;
TOP:READ FILE(INA)INTO(DATAA);
    READ FILE(INB)INTO(DATAB);
    READ FILE(INC)INTO(DATAC);
AVG=0.3*DATAA.DATA(32)+0.5*DATAB.DATA(32)+0.2*DATAC.DATA(32);
  PUT EDIT(DATAA.PART1(2),DATAA.PART1(3),AVG)(SKIP,F(6),F(3),F(8,2));
  GO TO TOP;
LAST:END AVE;
```

All the DD cards are the same except that the names on the GO file card change to GO.INA, GO.INB, and GO.INC.

The same program could be done without structures as shown below:

```
AVE:PROC OPTIONS(MAIN);
  DECLARE  (INA,INB,INC)FILE INPUT RECORD;
  ON ENDFILE(INA) GO TO LAST;
DECLARE (DATAA(38),DATAB(38),DATAC(38))FLOAT BINARY(21);
TOP: READ FILE(INA)INTO(DATAA);
     READ FILE(INB)INTO(DATAB);
     READ FILE(INC)INTO(DATAC);
   AVG=0.3*DATAA(38) + 0.5*DATAB(38) + 0.2*DATAC(38);
   PUT SKIP LIST(DATAA(2),DATAA(3),AVG);
   GO TO TOP;
LAST:END AVE;
```

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U.S. Geological Survey
Surface Water Records in Water-Supply Papers

	Part 10	Part 12	Part 13
Beginning of record through 1950 (monthly)	1314	1315	1316
1951-1960	1734	1736	1737
1961-1965	1927	1933	1934
1966-1970	2127	2133	2134
1971-Present	Water Resources Data for Idaho. Part 1. Surface water records.		

21.

U.S. Geological Survey
Water Quality Records in Water-Supply Papers

Year	Parts 9-14	Year	Parts 9-14	Year	Parts 9-11	Parts 12-14
1947	1102	1956	1453	1964	1958	1959
1948	1133	1957	1523	1965	1965	1966
1949	1163	1958	1574	1966	1995	1996
1950	1189	1959	1645	1967	2015	2016
1951	1200	1960	1745	1968	2098	2100
1952	1253	1961	1885	1969	2148	2150
1953	1293	1962	1945			
1954	1353	1963	1951			
1955	1401					

1970-Present — Water Resources Data for Idaho. Part 2. Water Quality Records.